

From: [Fisher, Sarah](#)
To: [Heller, Donald](#)
Cc: [Lam, Shelly](#); [David Favero](#); "[Marilyn Dedyne, GM](#)"
Subject: RE: Allison Transmission MW-0102-S2 Report
Date: Wednesday, April 16, 2014 11:17:56 AM
Attachments: [MW-0102_S2 Data Report_04-11-2014.pdf](#)

Shelly –

Attached is the data report, minus the analytical reports. Please let me know if you would like to receive the analytical reports as well. They are around 30MB.

Thanks!

Sarah

From: Heller, Donald [mailto:heller.donald@epa.gov]
Sent: Wednesday, April 16, 2014 11:43 AM
To: Fisher, Sarah
Cc: Lam, Shelly; David Favero; 'Marilyn Dedyne, GM'
Subject: Allison Transmission MW-0102-S2 Report

Hello Sarah,

Thank you for the 4-11-14 MW-0102-S2 Area Investigation Report. Would you forward a copy to Shelly Lam?

Thanks!

Don Heller

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MEMO

To:
Don Heller, USEPA

Copies:
Marilyn Dedyne, General Motors LLC
Sarah Fisher, ARCADIS
Teresa Colson, Allison Transmission
David Favero, Favero Geosciences
Francis Ramacciotti, ENVIRON
Speedway Public Library

From:
Meryl Stuckey
Heather Gastineau-Lyons

Date:
April 11, 2014

ARCADIS Project No.:
IN000473.0020

Subject:

General Motors RCRA Corrective Action at Allison Transmission,
MW-0102-S2 Area Investigation, December 2013-January 2014

Summary of Additional Investigation at MW-0102-S2

As proposed in an email submitted to USEPA on November 15, 2013, and approved via e-mail by USEPA on November 15, 2013, ARCADIS, on behalf of General Motors LLC (GM), performed additional investigation in the vicinity of MW-0102-S2. Five soil borings (SB-51-1302 through SB-51-1306) and three monitoring wells (MW-1305-S2 through MW-1307-S2) were installed between December 2013 and January 2014 (Drawing 1).

Soil Boring Installation

In mid-December 2013, ARCADIS oversaw the advancement of five soil borings (SB-51-1302 through SB-51-1306). ARCADIS contracted Major Drilling Services, LLC to operate a Geoprobe to continuously sample the soil to the desired depth and sample borehole water. The soil borings were continuously logged to depth and screened using a photoionization detector (PID, 11.7ev) at two foot intervals until the till unit was encountered, at approximately 38-47 feet (ft) below ground surface (bgs). Borehole water samples were collected in the lower saturated S2 unit, five feet directly above the till unit. Boring logs are included as Attachment A.



Upon sample collection, borehole water sampling containers were immediately sealed, labeled and placed in an ice-packed cooler that was transported to Pace Analytical Services, Inc. (Pace), located in Indianapolis, Indiana, observing proper chain-of-custody procedures. The borehole water samples were analyzed for volatile organic compounds (VOCs) in accordance with USEPA SW-846 Method 8260.

Monitoring Well Installation

In January 2014, ARCADIS oversaw the installation of three new monitoring wells (MW-1305-S2 through MW-1307-S2). ARCADIS contracted Major Drilling Services, LLC to operate a Minisonic to continuously sample the soil to the desired depth and install the monitoring wells. The soil was screened using a photoionization detector (PID, 11.7ev) at two foot intervals until the till unit was encountered. Boring logs with well construction details are included as Attachment A.

Monitoring wells MW-1305-S2 and MW-1306-S2 were installed in the saturated S2 unit with 15-foot screens. These monitoring wells were installed to provide additional groundwater elevation and groundwater quality data for the newly installed recovery well (RW-1301-S2). MW-1305-S2 tested positive for Sudan IV oleophilic dye at a smear zone with odor at approximately 20 ft bgs, indicating the presence of an LNAPL. This finding is consistent with other investigation performed at this area of the Site, and LNAPL is periodically observed in other monitoring wells in the vicinity of MW-1305-S2. The observed LNAPL is the eastern extent of the diesel fuel impacts associated with AOI-40. Recovery well RW-1301-S2 was installed on November 23, 2013. Details for the recovery well installation are included in the *AOI 51 Plume Extension Recovery Well Installation Report, March 31, 2014*.

Monitoring well MW-1307-S2 was installed with a five foot screen in the lower saturated S2 unit. This monitoring well is located downgradient of the five newly advanced soil borings to confirm groundwater quality at the apparent leading edge of the plume.

After completion of the monitoring well installation, each well was developed using a submersible whale pump to remove any water introduced to the formation during drilling and remove any sediment from the well. The well screen was surged and the well purged using the pump until each well was free of fine material and purge water was clear.

Passive diffusion bag (PDB) samplers were deployed on January 29, 2014. During PDB deployment, the depth to water and total depth were measured in each monitoring well to ensure proper positioning (midpoint of the screen unless otherwise specified) of the PDBs. In monitoring wells MW-1305-S2 and MW-1306-S2, three PDBs were installed to vertically profile the aquifer along the 15-foot well screen (PDBs were placed at 22-24 ft bgs, 26-28 ft bgs and 30.5-32.5 ft bgs). The PDBs were allowed two weeks to equilibrate within the well and were then retrieved for sampling on February 13, 2014. No sample was able to be retrieved from the PDB bag set from 22-24 ft bgs in monitoring well MW-1305-S2. On February 13, 2014, another PDB bag was placed at the 22-24 ft interval in this monitoring well and was later sampled on February 28, 2014.



Upon sample collection, groundwater sampling containers were immediately sealed, labeled and placed in an ice-packed cooler that was transported to Pace, located in Indianapolis, Indiana, observing proper chain-of-custody procedures. The groundwater samples were analyzed for VOCs in accordance with USEPA SW-846 Method 8260.

Summary of Results

On December 19 and 20, 2013, the unvalidated analytical results for soil borings SB-51-1302 through SB-51-1306 were available and summarized in the *Interim Measures Semi-Annual Remediation Status & Groundwater Monitoring Report Second Half 2013*. Since then, the data has been validated and the validation memo is provided in Attachment B, along with the analytical results. Validated analytical results do not alter the data or use for the data submitted in the *Interim Measures Semi-Annual Remediation Status & Groundwater Monitoring Report Second Half 2013*. Trichloroethene (TCE) was reported as estimated concentrations in SB-51-1303 at 0.002 J mg/L, and in SB-51-1305 at 0.0013 J mg/L, which are both below the maximum contaminant level (MCL) of 0.005 mg/L.

On January 22, 2014, on-site recovery well RW-1301-S2 was sampled and analyzed for VOCs. Cis-1,2-dichloroethene (cis-1,2-DCE), tetrachloroethene (PCE), TCE and vinyl chloride were all detected above their respective MCLs.

Groundwater samples were collected from separate intervals within the two monitoring wells (MW-1305-S2 and MW-1306-S2) installed to provide data to aid in evaluation of the performance of the Plume Extension Groundwater Extraction System and analyzed for VOCs. PCE, TCE, cis-1,2-DCE and vinyl chloride were detected above their respective MCL in one or more intervals sampled from these monitoring wells.

In the groundwater samples collected from monitoring well MW-1306-S2, cis-1,2-DCE, 1,2,4-trichlorobenzene and vinyl chloride were detected at estimated concentrations but below their MCLs.

A groundwater sample was collected from the monitoring well (MW-1307-S2) installed to monitor the downgradient boundary of the plume extension and analyzed for VOCs. The only VOC detected in monitoring well MW-1307-S2 was TCE, at an estimated concentration of 0.0013J mg/L, which is below the MCL.

Select VOCs for many of the locations in the vicinity and downgradient from MW-0102-S2 are presented in Drawing 2 and all laboratory analytical results are provided in Attachment B. The validated analytical reports not included with this memo will be provided in the *Interim Measures Semi-Annual Remediation Status & Groundwater Monitoring Report First Half 2014*, forthcoming in July 2014.



3D Model

Geological and chemical data collected during this investigation were used to update the 3D visualization of the area in and around the southern part of Plant 12 (Model Area). The update is intended to provide data visualization to assist in understanding the geologic setting relative to the groundwater and borehole water quality data (PCE, TCE and vinyl chloride) in the Model Area. The update includes all analytical data collected to date, including the unvalidated analytical data from monitoring wells MW-1305-S2 through MW-1307-S2. Screenshots from the Mining Visualization Software (MVS) model are included as Attachment D.

Conclusions

The stratigraphy observed and the analytical results from this investigation are consistent with the information and data presented in the *MW-0102-S2 Investigation Summary* (October 2012) and the *Interim Measures Semi-Annual Remediation Status & Groundwater Monitoring Report Second Half 2013* (January 2014). The recent investigation also provides delineation of the plume extension downgradient of MW-1301-S2 to below MCLs.

It is noted that while PCE was released at AOI 51, the furthest downgradient impacts observed are cis-1,2-DCE and TCE. The low levels of TCE at SB-51-1303 (0.002 J), SB-51-1305 (0.0013J mg/L) and MW-1307-S2 (0.0013J mg/L); and only a degradation daughter concentration of cis-1,2-DCE at MW-1206-S2 (0.0031 J mg/L on October 2013) indicate that the TCE observed may have potentially resulted from a different source than the upgradient portion of the plume extension. The upgradient portion of the plume extension exhibits a different constituent signature; samples from investigation locations in the upgradient portion of the plume extension contain PCE and other degradation daughter products, in addition to TCE. One potential source of the TCE could be legacy contamination from residential use of TCE-based septic tank cleaning agents (septic tanks are understood to be present upgradient of these wells).

Based on the data and information presented herein and in the previous memos, no additional investigation is proposed for this area at this time.

Groundwater samples from monitoring wells MW-1305-S2, MW-1306-S2, and MW-1307-S2 are currently being collected for VOC analysis in April 2014. Additionally, monitoring wells installed during the calendar years of 2012 (MW-1202-S2 through MW-1207-S2) and 2013 (MW-1301-S2 and MW-1302-S2), located in the neighborhood south of MW-0102-S2, are being sampled and analyzed for VOCs in April 2014. These results will be summarized in the *Interim Measures Semi-Annual Remediation Status & Groundwater Monitoring Report First Half 2014*, due to USEPA in July 2014. Monitoring wells MW-1301-S2, MW-1302-S2, and MW-1307-S2 will be sampled again during the Fall 2014 monitoring event.



Enclosures:

Drawing 1 – MW-0102-S2 Area

Drawing 2 – Groundwater and Borehole Water VOC Analytical Results – AOI 51 South and Main Plant Perimeter

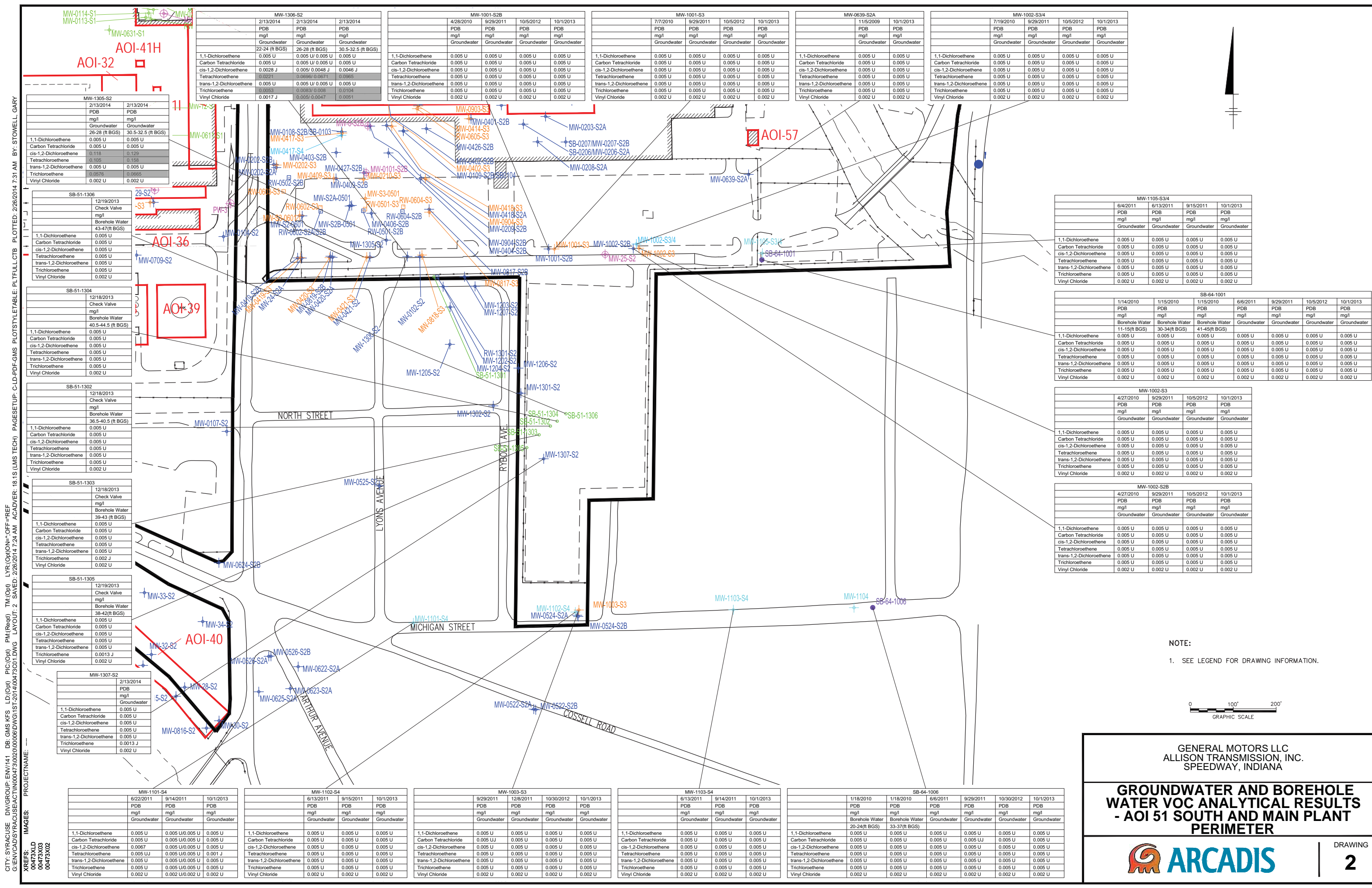
Attachment A – Boring Log and Monitoring Well Construction Diagrams

Attachment B – Laboratory Analytical Reports (on CD)

Attachment C – Drawing 10 from the *Interim Measures Semi-Annual Remediation Status & Groundwater Monitoring Report Second Half 2013, January 2014*

Attachment D – MVS Model Screenshots

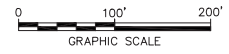
DRAWINGS



CITY: SYRACUSE DIV/GRP: ENV/141 DB: GMS KFS LD(Orig) PIC(Orig) PM(Ref) LVR(Orig) OFF=REF
G:\ENVCAD\SYRACUSE\ACT\IN0047300200006\DWG\IST-201400473001.DWG LAYOUT: 2. SAVED: 2/26/2014 7:24 AM ACADVER: 18.1S (LMS TECH) PAGES: 18.1S (LMS TECH) PLOT: PLT-00473001.DWG BY: STOWELL, GARY

PROJECT NAME: 00473001
XREFS: 00473001
00473003
00473002

NOTE:
1. SEE LEGEND FOR DRAWING INFORMATION.



GENERAL MOTORS LLC
ALLISON TRANSMISSION, INC.
SPEEDWAY, INDIANA

GROUNDWATER AND BOREHOLE
WATER VOC ANALYTICAL RESULTS
- AOI 51 SOUTH AND MAIN PLANT
PERIMETER

DRAWING
2

ATTACHMENT A: Boring Log and Monitoring Well Construction Diagrams



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BORING LOG

BORING LOG: **SB-51-1302**

TOTAL DEPTH (ft): **44.0**

PROJECT INFORMATION

PROJECT: **GM (Allison Transmission)**

SITE LOCATION: **Speedway, IN**

LOGGED BY: **Luke Martin**

DATE STARTED: **12/17/2013**

DATE COMPLETED: **12/17/2013**

DRILLING INFORMATION

DRILLING CO.: **Major Drilling**

DRILLER: **Ken Burkhard**

DRILLING METHOD: **Hand Auger / Direct Push**

COORDINATES

NORTHING: 1649240.6

EASTING: 169241.9

ELEVATION: 718.83

DEPTH	SOIL SYMBOLS	SOIL DESCRIPTION	MOISTURE	SAMPLE NUMBER	SUDAN IV	PID (ppm)
0		ASPHALT: Asphalt		SB-51-1302-01_GEO		0.0
		FILL: FILL; angular gravel; perched water at approximately 0.5'.		SB-51-1302-02_GEO		0.0
-5		CLAY: CLAY; some sand; little silt; little gravel; high plasticity (no added moisture); coarse sand to granules; angular; moist; brown; perched water in clay.		SB-51-1302-03_GEO		--
		SAND and GRAVEL: SAND and GRAVEL; trace silt; silt to very large pebbles; rounded to subangular; poorly sorted; dry; loose; brown to yellowish brown. 5.0-10.0' - No recovery, rock in shoe?. 18.8-19.5' - zone of fine sands, grey to yellowish brown. Top of zone is wet due to perched water at top, bottom of unit is dry. 21.1-22.3' - lens of rounded pebbles. 18.6' - Moist. 22.0' - Wet. 28.9-29.0' - small clay lense.		SB-51-1302-04_GEO		--
-10				SB-51-1302-05_GEO		--
				SB-51-1302-06_GEO		0.0
-15				SB-51-1302-07_GEO		0.1
				SB-51-1302-08_GEO		0.1
-20				SB-51-1302-09_GEO		0.2
				SB-51-1302-10_GEO		0.4
-25				SB-51-1302-11_GEO		0.6
				SB-51-1302-12_GEO		0.9
-30				SB-51-1302-13_GEO		0.8
				SB-51-1302-14_GEO		0.8
-35		GRAVEL and SAND: GRAVEL and SAND; silt to very large pebbles; rounded to subangular; poorly sorted; wet; brown.		SB-51-1302-15_GEO		0.7
				SB-51-1302-16_GEO		0.1
-40				SB-51-1302-17_GEO		0.1
				SB-51-1302-18_GEO		0.1
				SB-51-1302-19_GEO		0.0
				SB-51-1302-20_GEO	Negative at 40.5 ft	0.1
		Clay: CLAY and SILT (TILL); low plasticity; trace round granules; dry; very stiff; dark grey.		SB-51-1302-21_GEO		0.1
				SB-51-1302-22_GEO		0.0



BORING LOG

BORING LOG: **SB-51-1303**

TOTAL DEPTH (ft): **45.0**

PROJECT INFORMATION

PROJECT: **GM (Allison Transmission)**

SITE LOCATION: **Speedway, IN**

LOGGED BY: **Luke Martin**

DATE STARTED: **12/18/2013**

DATE COMPLETED: **12/18/2013**

DRILLING INFORMATION

DRILLING CO.:

DRILLER: **Ken Burkhard**

DRILLING METHOD: **Hand Auger / Direct Push**

COORDINATES

NORTHING: 1649220.3

EASTING: 169215.7

ELEVATION: 719.44

DEPTH	SOIL SYMBOLS	SOIL DESCRIPTION	MOISTURE	SAMPLE NUMBER	SUDAN IV	PID (ppm)
0		ASPHALT: Asphalt		SB-51-1303-01_GEO		0.1
		FILL: Fill material; angular gravel		SB-51-1303-02_GEO		0.2
-5		CLAY and SAND: CLAY and SAND; some silt; trace gravel; slightly moist; dark brown; possible fill material. 3.9' - grading to Clay and Silt; some sand		SB-51-1303-03_GEO		0.2
		SAND and GRAVEL: SAND and GRAVEL; trace silt; silt to very large pebbles; round to subangular gravel; poorly sorted; dry; loose; yellowish brown. 18.7-19.0' - CLAY and SILT; some sand lenses; brown. 23.4' - moist; brown. 24.0' - Wet.		SB-51-1303-04_GEO		0.2
-10				SB-51-1303-05_GEO		0.2
				SB-51-1303-06_GEO		0.1
-15				SB-51-1303-07_GEO		0.2
				SB-51-1303-08_GEO		0.1
-20				SB-51-1303-09_GEO		0.2
				SB-51-1303-10_GEO		0.3
-25				SB-51-1303-11_GEO		0.2
				SB-51-1303-12_GEO		0.4
-30				SB-51-1303-13_GEO		0.3
				SB-51-1303-14_GEO		0.4
-35				SB-51-1303-15_GEO		0.5
				SB-51-1303-16_GEO		0.4
-40				SB-51-1303-17_GEO		0.5
				SB-51-1303-18_GEO		0.6
-45				SB-51-1303-19_GEO		0.5
				SB-51-1303-20_GEO		0.4
				SB-51-1303-21_GEO		0.6
				SB-51-1303-22_GEO	Negative at 43.0 ft	0.5
		Clay: CLAY and SILT (TILL); low plasticity; trace round gravels; slightly moist; very stiff; grey.		SB-51-1303-23_GEO		0.5



BORING LOG

BORING LOG: **SB-51-1304**

TOTAL DEPTH (ft): **45.0**

PROJECT INFORMATION

PROJECT: **GM (Allison Transmission)**

SITE LOCATION: **Speedway, IN**

LOGGED BY: **Luke Martin**

DATE STARTED: **12/18/2013**

DATE COMPLETED: **12/18/2013**

DRILLING INFORMATION

DRILLING CO.: **Major Drilling**

DRILLER: **Ken Burkhard**

DRILLING METHOD: **Hand Auger / Direct Push**

COORDINATES

NORTHING: 1649252.0

EASTING: 169257.9

ELEVATION: 718.50

DEPTH	SOIL SYMBOLS	SOIL DESCRIPTION	MOISTURE	SAMPLE NUMBER	SUDAN IV	PID (ppm)
0		ASPHALT: Asphalt		SB-51-1304-01_GEO		0.0
		FILL: FILL; angular gravel.		SB-51-1304-02_GEO		0.2
-5		CLAY and SAND: CLAY and SAND; some silt; trace gravel and pieces of brick; fine sand; slightly moist; dark brown. Possible fill material for lot.		SB-51-1304-03_GEO		0.1
		SAND and GRAVEL: SAND and GRAVEL; trace silt; silt to very large pebbles; poorly sorted; dry; loose; yellowish brown to grey. 21.9' - Moist; brown; round to subangular gravel. 22.2' - Wet.		SB-51-1304-04_GEO		0.3
-10				SB-51-1304-05_GEO		0.2
				SB-51-1304-06_GEO		0.2
-15				SB-51-1304-07_GEO		0.3
				SB-51-1304-08_GEO		0.2
-20				SB-51-1304-09_GEO		0.2
				SB-51-1304-10_GEO		0.3
-25				SB-51-1304-11_GEO		0.3
				SB-51-1304-12_GEO		0.2
-30				SB-51-1304-13_GEO		0.5
		GRAVEL and SAND: GRAVEL and SAND; silt to large pebbles; round to subangular gravel; poorly sorted; saturated; brown.		SB-51-1304-14_GEO		0.3
-35				SB-51-1304-15_GEO		0.3
				SB-51-1304-16_GEO		0.3
-40				SB-51-1304-17_GEO		0.4
				SB-51-1304-18_GEO		0.4
-45				SB-51-1304-19_GEO		0.5
				SB-51-1304-20_GEO		0.5
				SB-51-1304-21_GEO		0.4
		TILL: CLAY and SILT (TILL); low plasticity; trace rounded granules; very stiff; slightly moist; greyish brown.		SB-51-1304-22_GEO	Negative at 44.5 ft	0.4
				SB-51-1304-23_GEO		0.4



BORING LOG

BORING LOG: **SB-51-1305**

TOTAL DEPTH (ft): **45.0**

PROJECT INFORMATION

PROJECT: **GM (Allison Transmission)**

SITE LOCATION: **Speedway, IN**

LOGGED BY: **Luke Martin**

DATE STARTED: **12/19/2013**

DATE COMPLETED: **12/19/2013**

DRILLING INFORMATION

DRILLING CO.: **Major Drilling**

DRILLER: **Ken Burkhard**

DRILLING METHOD: **Hand Auger / Direct Push**

COORDINATES

NORTHING: 1649190.4

EASTING: 169186.9

ELEVATION: 719.92

DEPTH	SOIL SYMBOLS	SOIL DESCRIPTION	MOISTURE	SAMPLE NUMBER	SUDAN IV	PID (ppm)
0		TOPSOIL: TOPSOIL		SB-51-1305-01_GEO		0.1
-5		CLAY AND SILT: CLAY and SILT; some sand; medium plasticity; clay to fine sand; slightly moist; soft; brown. No added moisture.		SB-51-1305-02_GEO		0.2
				SB-51-1305-03_GEO		0.2
				SB-51-1305-04_GEO		0.3
-10		SAND and GRAVEL: SAND and GRAVEL; trace silts; silt to large pebbles; rounded to subangular pebbles; poorly sorted; dry; loose; brown to yellowish brown. 23.6' - Moist. 24.0' - Wet.		SB-51-1305-05_GEO		0.3
				SB-51-1305-06_GEO		0.2
				SB-51-1305-07_GEO		0.2
-15				SB-51-1305-08_GEO		0.3
				SB-51-1305-09_GEO		0.2
-20				SB-51-1305-10_GEO		0.3
				SB-51-1305-11_GEO		0.6
-25				SB-51-1305-12_GEO		1.0
				SB-51-1305-13_GEO		1.2
-30		GRAVEL and SAND: GRAVEL and SAND; same as above, but greater gravel content.		SB-51-1305-14_GEO		1.6
				SB-51-1305-15_GEO		1.4
-35				SB-51-1305-16_GEO		0.7
				SB-51-1305-17_GEO		1.0
-40		SAND: SAND; some gravel; fine sand to medium pebbles; course grain sand dominates; poorly sorted; wet; loose.		SB-51-1305-18_GEO		1.1
				SB-51-1305-19_GEO		1.3
-45		TILL: CLAY and SILT (TILL); low plasticity; trace rounded gravels; slightly moist; very stiff; dark grey.		SB-51-1305-20_GEO		1.7
				SB-51-1305-21_GEO	Negative	1.4
				SB-51-1305-22_GEO		1.2
				SB-51-1305-23_GEO		1.1



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BORING LOG

BORING LOG: **SB-51-1306**

TOTAL DEPTH (ft): **50.0**

PROJECT INFORMATION

PROJECT: **GM (Allison Transmission)**

SITE LOCATION: **Speedway, IN**

LOGGED BY: **Luke Martin**

DATE STARTED: **12/19/2013**

DATE COMPLETED: **12/19/2013**

DRILLING INFORMATION

DRILLING CO.: **Major Drilling**

DRILLER: **Ken Burkhard**

DRILLING METHOD: **Hand Auger / Direct Push**

COORDINATES

NORTHING: 1649269.4

EASTING: 169278.3

ELEVATION: 717.86

DEPTH	SOIL SYMBOLS	SOIL DESCRIPTION	MOISTURE	SAMPLE NUMBER	SUDAN IV	PID (ppm)
0		ASPHALT: Asphalt		SB-51-1306-01_GEO		0.2
		FILL: FILL, angular gravel		SB-51-1306-02_GEO		0.7
-5		CLAY and SAND: CLAY and SAND; some silt; trace gravel; medium plasticity; slightly moist; soft; dark brown.		SB-51-1306-03_GEO		0.9
		SAND and GRAVEL: SAND and GRAVEL; trace silt; silt to large pebbles; poorly sorted; dry; loose; yellowish brown and grey. 7.1' - brown. 21.1' - Moist. 21.9' - Wet.		SB-51-1306-04_GEO		1.4
-10				SB-51-1306-05_GEO		1.2
				SB-51-1306-06_GEO		1.3
-15				SB-51-1306-07_GEO		0.6
				SB-51-1306-08_GEO		0.9
-20				SB-51-1306-09_GEO		1.1
				SB-51-1306-10_GEO		1.5
-25				SB-51-1306-11_GEO		1.4
				SB-51-1306-12_GEO		1.7
-30				SB-51-1306-13_GEO		1.5
				SB-51-1306-14_GEO		1.6
-35				SB-51-1306-15_GEO		1.6
		GRAVEL and SAND: GRAVEL and SAND; trace silt; same as above, but more gravel than sand.		SB-51-1306-16_GEO		1.4
-40				SB-51-1306-17_GEO		1.6
				SB-51-1306-18_GEO		1.5
-45				SB-51-1306-19_GEO		1.2
				SB-51-1306-20_GEO		1.2
-50				SB-51-1306-21_GEO		1.4
				SB-51-1306-22_GEO		1.4
				SB-51-1306-23_GEO		1.6
		TILL: CLAY and SILT (TILL) encountered, but recovery is all sand and gravel above and below small piece of till. Heaving sands from 35.0 - 50.0'. Unable to blow down past 20.0' due to compaction.		SB-51-1306-24_GEO	Negative at 47.0 ft	1.5
				SB-51-1306-25_GEO		1.4



ARCADIS

WELL CONSTRUCTION LOG

WELL NO.: **MW-1305-S2**

TOTAL DEPTH (ft): **35.0**

PROJECT INFORMATION

PROJECT: **GM (Allison Transmission)**

SITE LOCATION: **Speedway, IN**

LOGGED BY: **Wesley Kuhn**

DATE STARTED: **1/20/2014**

DATE COMPLETED: **1/21/2014**

DRILLING INFORMATION

DRILLING CO.: **Major Drilling**

DRILLER: **Wesley Casteel**

DRILLING METHOD: **Hand Auger / Roto Sonic**

COORDINATES:

Northings: 1649673.91

Easting: 168859.82

TOC Elevation: 717.79

DEPTH	SOIL SYMBOLS	SOIL DESCRIPTION	SAMPLE ID	SUDAN IV	PID (ppm)	WELL CONSTRUCTION DETAILS
0		ASPHALT: Asphalt pad	MW-1305-S2-01_GEO		0.2	Casing: PVC Sch 40 Seal: Bentonite-pellets
		FILL: FILL; gravel road pack; clay; silts; sands; small cobbles	MW-1305-S2-02_GEO		0.2	
		CLAY: CLAY; some silt; high to medium plasticity; trace sand and pebbles; small to very large pebbles; poorly sorted; moist; dark brown (10YR 3/3)	MW-1305-S2-03_GEO		0.3	
5			MW-1305-S2-04_GEO		12.3	
		SAND: SAND; medium to fine grained; well sorted; moist; shell fragments 3.5' - dark grey (10YR 4/1) 4.5' - dark brown (10YR 3/3) 5.0' - yellowish brown (10YR 5/6)	MW-1305-S2-05_GEO		31.9	
			MW-1305-S2-06_GEO		28.0	
10		SAND AND SILT: SAND and SILT; trace clay; trace very large to small pebbles; non-plastic; loose; dry; stiff; yellowish brown (10 YR 5/4)	MW-1305-S2-07_GEO		8.8	
		CLAY: CLAY; high to medium plasticity; trace silt; trace sand and pebbles; tacky; moist; very soft; dark brown (10YR 3/3)	MW-1305-S2-08_GEO		11.7	
15			MW-1305-S2-09_GEO		15.1	
		SAND and GRAVEL: SAND and GRAVEL; fine grained to very large pebbles; angular to rounded pebbles; poorly sorted; loose; dark yellowish brown (10YR 4/6) 20.0' - saturated; wet; smear zone; odor; staining grey; very dark greyish brown (10YR 3/2); coarse grained to very large pebbles 24.5' - trace silts and clays; stiff 25.0' - coarse grained to small cobble 27.8-28.1' - clay; some silt; medium to high plasticity; trace small rounded pebbles; moist; yellowish brown (10YR 5/6)	MW-1305-S2-10_GEO		8.3	Filter Pack: Sand
			MW-1305-S2-11_GEO		101.5	
20			MW-1305-S2-12_GEO	Positive Sudan IV	259.3	Screen: PVC Sch 40
			MW-1305-S2-13_GEO		295.8	
			MW-1305-S2-14_GEO		90.8	
25			MW-1305-S2-15_GEO		8.7	
			MW-1305-S2-16_GEO		25.3	
			MW-1305-S2-17_GEO		9.8	
30			MW-1305-S2-18_GEO		30.8	
		Clay: CLAY (TILL); some silt; no to low plasticity; trace small rounded pebbles; moist to dry; very stiff; yellowish brown (10YR 5/6) 34.2' - color change, dark grey (10YR 4/1) 32.5-33.0' - sand lens; fine to medium grained; well sorted	MW-1305-S2-19_GEO	Negative Sudan IV	11.6	
35			MW-1305-S2-20_GEO		6.4	



ARCADIS

WELL CONSTRUCTION LOG

WELL NO.: **MW-1306-S2**

TOTAL DEPTH (ft): **35.0**

PROJECT INFORMATION

PROJECT: **GM (Allison Transmission)**

SITE LOCATION: **Speedway, IN**

LOGGED BY: **Wesley Kuhn**

DATE STARTED: **1/20/2014**

DATE COMPLETED: **1/20/2014**

DRILLING INFORMATION

DRILLING CO.: **Major Drilling**

DRILLER: **Wesley Casteel**

DRILLING METHOD: **Hand Auger / Roto Sonic**

COORDINATES:

Northings:

Easting:

TOC Elevation:

DEPTH	SOIL SYMBOLS	SOIL DESCRIPTION	SAMPLE ID	SUDAN IV	PID (ppm)	WELL CONSTRUCTION DETAILS
0		TOPSOIL: TOPSOIL and grass	MW-1306-S2-01_GEO		0.0	Casing: PVC Sch 40 Seal: Bentonite-pellets
		CLAY AND SILT: CLAY and SILT; some sand; poorly sorted; moist; loose; dark yellowish brown (10YR 4/4) 3.0' - increase CLAY content; medium to high plasticity; trace sands and gravels; moist; tacky; soft to medium stiff; dark brown (10YR 3/3) 3.5' - increase gravels; medium to very large pebbles 4.0' - increase sand content 5.0' - small cobble	MW-1306-S2-02_GEO MW-1306-S2-03_GEO MW-1306-S2-04_GEO MW-1306-S2-05_GEO		0.0 0.0 0.0 0.8	
5		SAND and GRAVEL: SAND and GRAVEL; medium grained to small cobbles; poorly sorted; dry to moist; very loose; yellowish brown (10YR 5/6) 18.0' - increase silt content; dry; friable; stiff (clumps) 20.0' - medium grained to very large pebbles; wet; saturated; brown (10YR 5/3) 29.5' - increase silts; medium stiff to stiff; friable	MW-1306-S2-06_GEO MW-1306-S2-07_GEO MW-1306-S2-08_GEO MW-1306-S2-09_GEO MW-1306-S2-10_GEO MW-1306-S2-11_GEO MW-1306-S2-12_GEO MW-1306-S2-13_GEO MW-1306-S2-14_GEO MW-1306-S2-15_GEO MW-1306-S2-16_GEO MW-1306-S2-17_GEO		1.5 1.2 1.4 1.6 1.5 12.8 20.1 3.8 6.4 7.2 16.8 5.8	Filter Pack: Sand Screen: PVC Sch 40
30		SAND: SAND; fine to medium grained; well sorted; wet; yellowish brown (10YR 5/4)	MW-1306-S2-18_GEO	Negative Sudan IV	3.9 1.0	
35		TILL: CLAY (TILL); trace silt; non-plastic; trace rounded medium to very large pebbles; very stiff; friable; dark grey (10YR 4/1)	MW-1306-S2-19_GEO		0.9	



ARCADIS

WELL CONSTRUCTION LOG

WELL NO.: **MW-1307-S2**

TOTAL DEPTH (ft): **42.0**

PROJECT INFORMATION

PROJECT: **GM (Allison Transmission)**

SITE LOCATION: **Speedway, IN**

LOGGED BY: **Tim Porter**

DATE STARTED: **1/22/2014**

DATE COMPLETED: **1/22/2014**

DRILLING INFORMATION

DRILLING CO.: **Major Drilling**

DRILLER: **Wesley Casteel**

DRILLING METHOD: **Hand Auger / Roto Sonic**

COORDINATES:

Northings:

Easting:

TOC Elevation:

DEPTH	SOIL SYMBOLS	SOIL DESCRIPTION	SAMPLE ID	SUDAN IV	PID (ppm)	WELL CONSTRUCTION DETAILS
0		ASPHALT: Asphalt pad	MW-1307-S2-01_GEO		0.8	Casing; PVC Sch 40
		FILL: FILL	MW-1307-S2-02_GEO		0.3	Seal: Bentonite-pellets
5		CLAY: CLAY; clay loam; plastic; few gravels; slightly moist; dark yellowish brown (10YR 4/6)	MW-1307-S2-03_GEO		1.0	
		CLAY and SAND: CLAY and SAND; loamy sand; loose; dry to slightly moist; yellowish brown (10YR 5/4)	MW-1307-S2-04_GEO		2.3	
			MW-1307-S2-05_GEO		1.2	
10			MW-1307-S2-06_GEO		0.2	
		SAND and GRAVEL: SAND and GRAVEL; single grained; non-cohesive; slightly moist; loose; yellowish brown (10YR 5/4) 11.0-12.5' - moist; iron oxidation; yellowish brown (10YR 5/6) 19.5-20.0' - slightly inclusion of silt and clay 20.0' - Sand and Gravel; loose; Wet	MW-1307-S2-07_GEO		0.9	
			MW-1307-S2-08_GEO		2.7	
			MW-1307-S2-09_GEO		1.0	
			MW-1307-S2-10_GEO		0.7	
20			MW-1307-S2-11_GEO		1.6	
			MW-1307-S2-12_GEO		1.2	
			MW-1307-S2-13_GEO		0.9	
			MW-1307-S2-14_GEO		1.0	
			MW-1307-S2-15_GEO		0.9	
30			MW-1307-S2-16_GEO		0.9	
			MW-1307-S2-17_GEO		0.7	
		SAND: SAND; fine to medium grained; few silts; wet; loose; dark yellowish brown (10YR 4/4) 35.0-38.0' - color change to grey (10YR 5/1)	MW-1307-S2-18_GEO		1.7	
			MW-1307-S2-19_GEO		2.1	
			MW-1307-S2-20_GEO	Negative Sudan IV	1.2	Filter Pack: Sand
40		TILL: CLAY (TILL); clayey silt; few sands and gravels; non-plastic; stiff; grey (10YR 5/1)	MW-1307-S2-21_GEO		0.5	Screen: PVC Sch 40

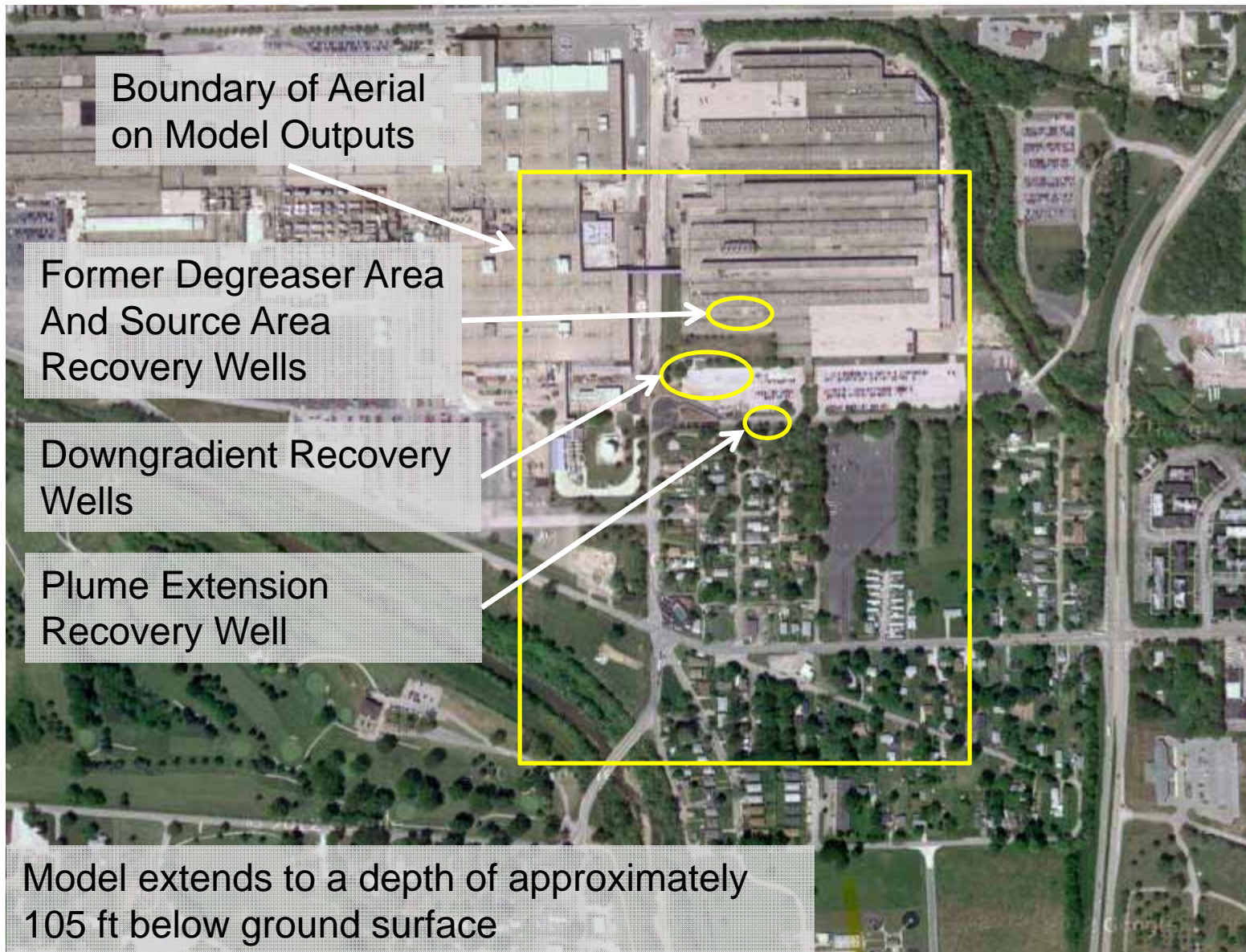
ATTACHMENT C: Drawing 10 from the *Interim
Measures Semi-Annual Remediation Status &
Groundwater Monitoring Report Second Half
2013*

ATTACHMENT D: MVS MODEL SCREENSHOTS

Geologic and Contaminant Modeling

General Motors LLC
at Allison Transmission
Southern Portion of Plant 12

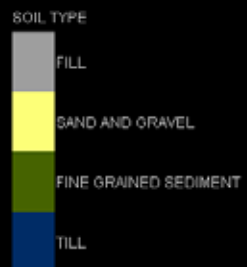
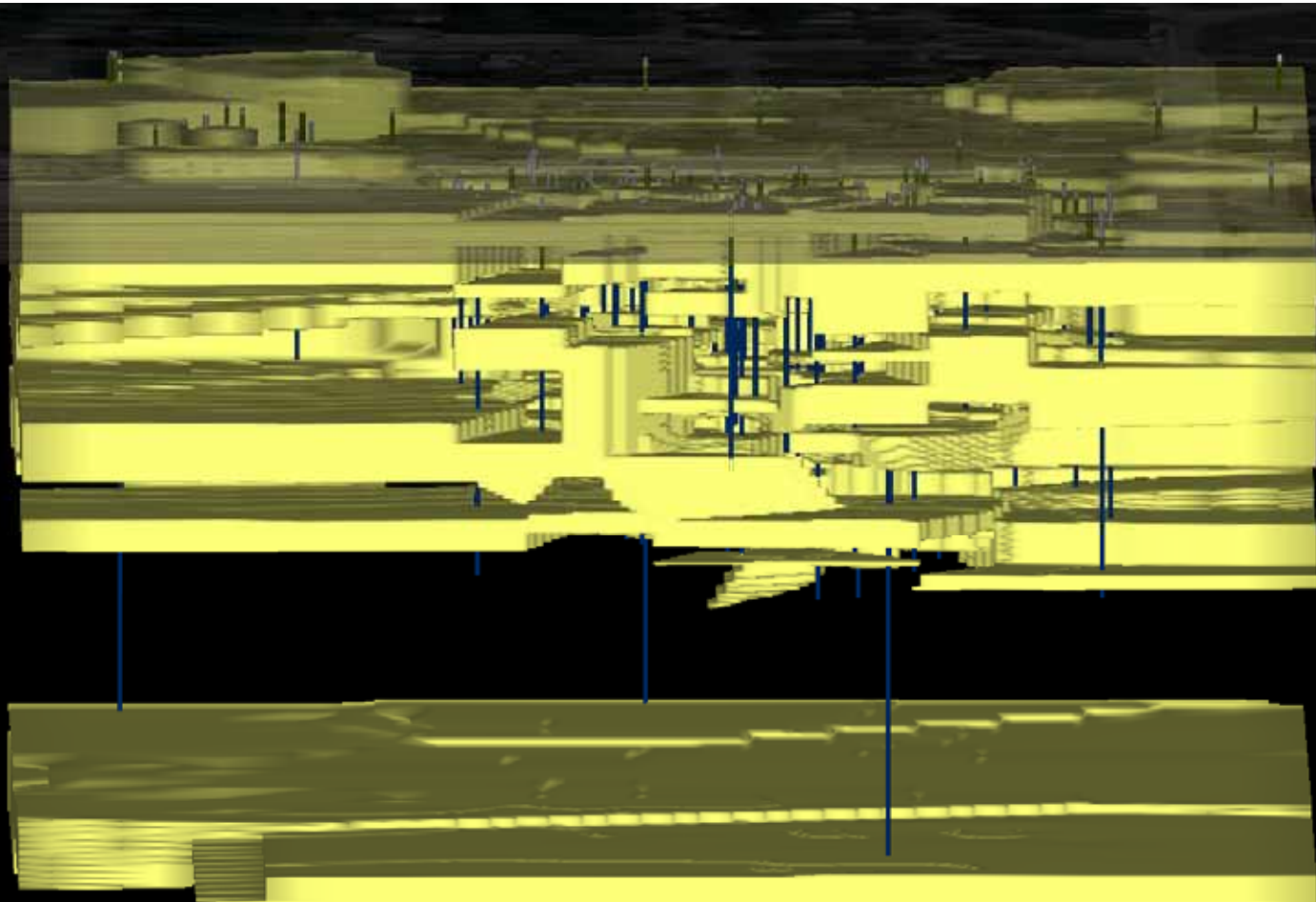
Model Area



Imagine the result

Sand and Gravel Units

View Indicator

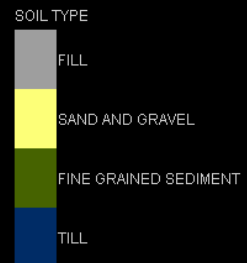
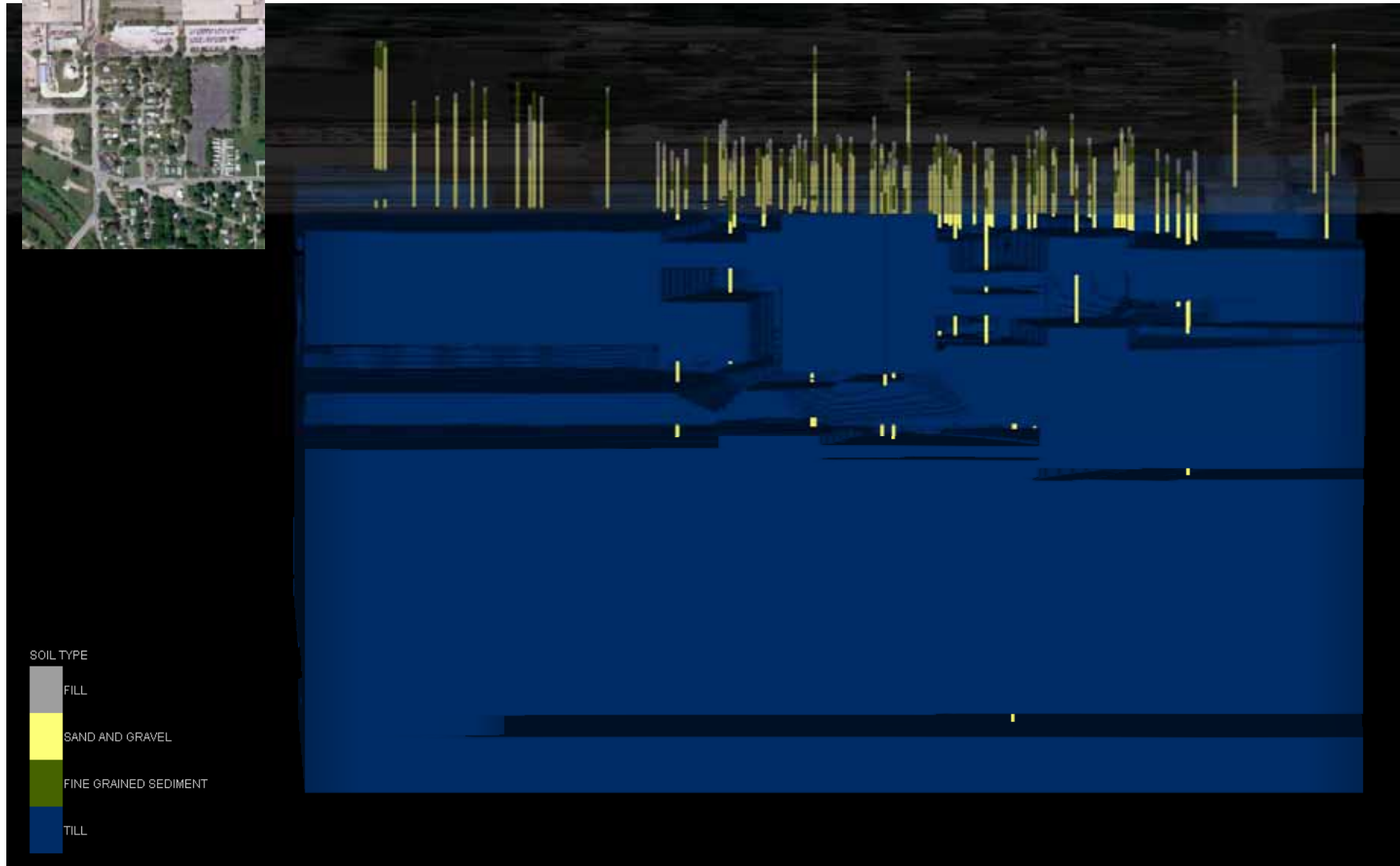


Note: Each soil boring and/or monitoring well location used to generate the model is shown with the appropriate lithology (see symbols above)

View Indicator



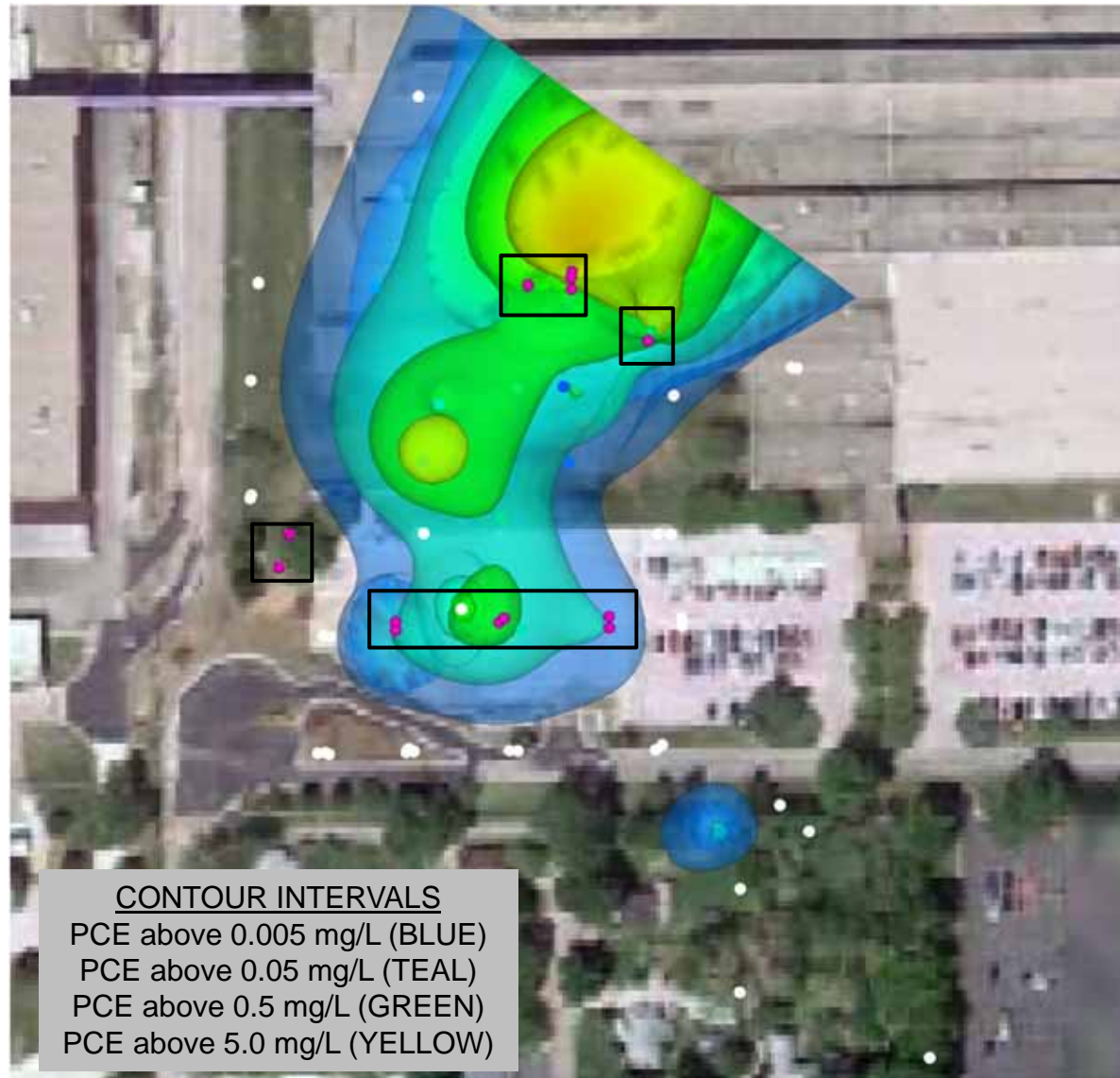
Clay/Till Units



Note: Each soil boring and/or monitoring well location used to generate the model is shown with the appropriate lithology (see symbols above)

OCTOBER 2012 PCE CONCENTRATIONS IN GROUNDWATER

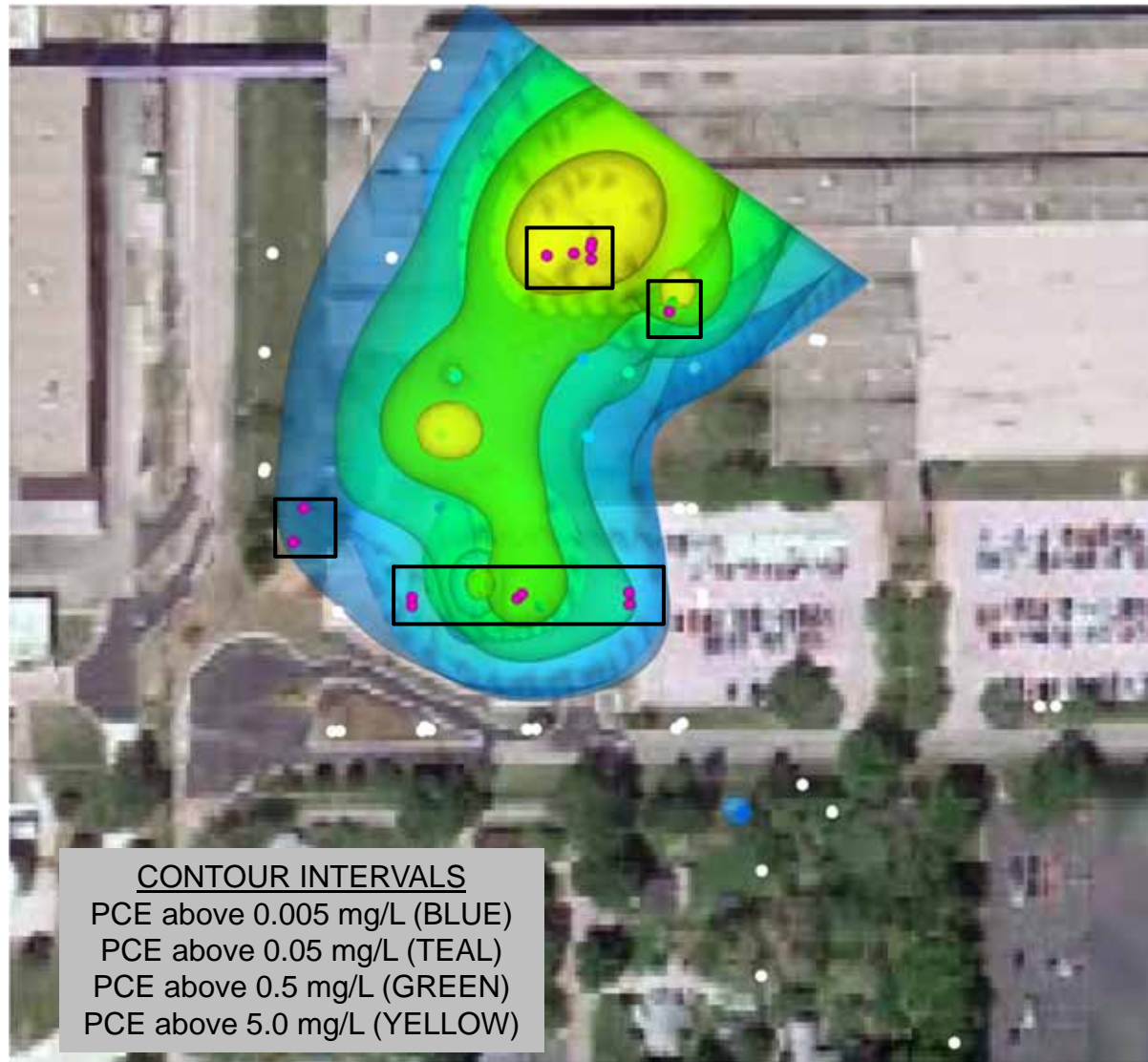
(View from above showing entire depth of model)



NOTE: Recovery wells shown as magenta dot. • The model is updated showing only October 2012 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER-NOVEMBER 2013 PCE CONCENTRATIONS IN GROUNDWATER

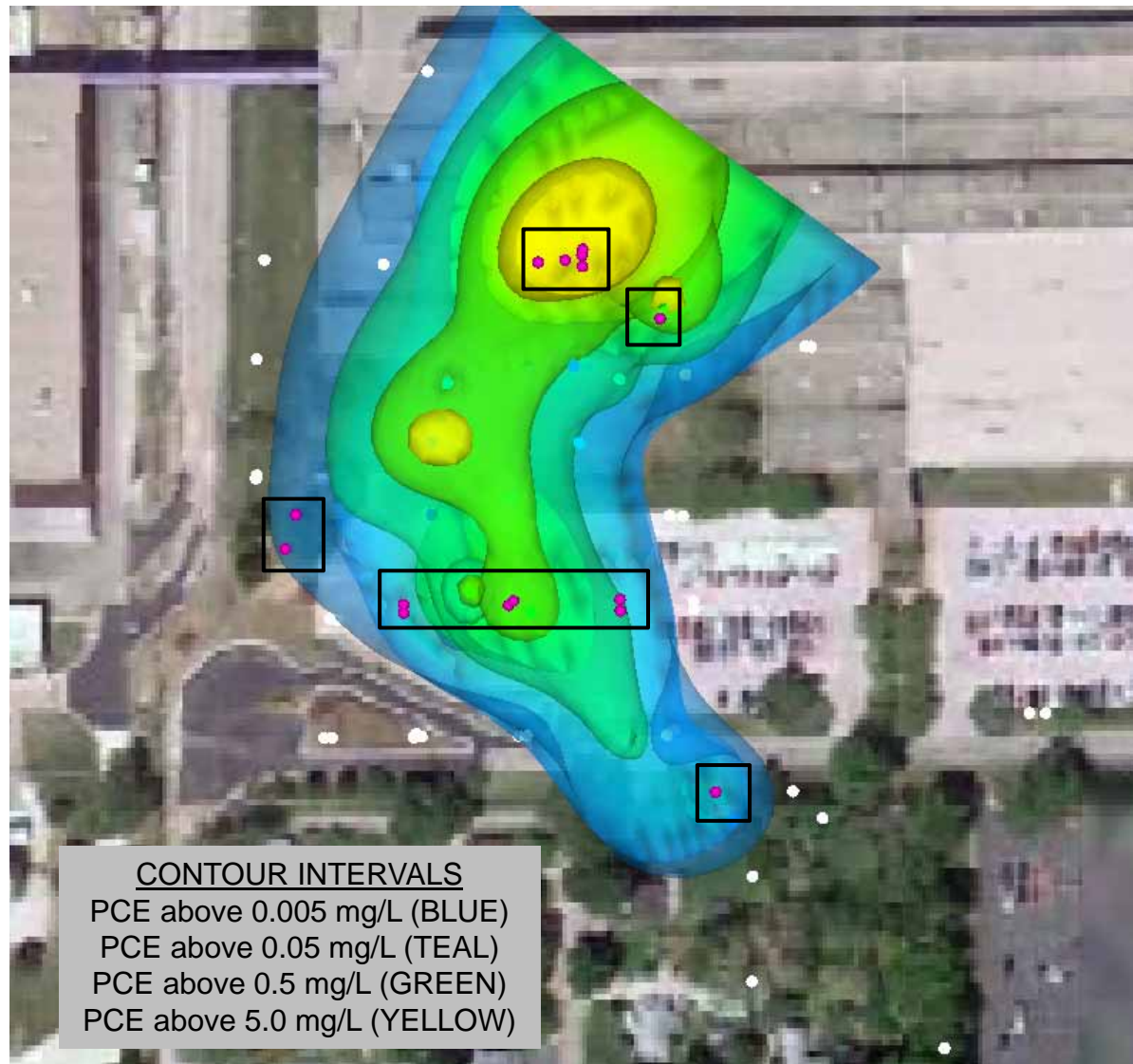
(View from above showing entire depth of model)



NOTE: Recovery wells shown as magenta dot. • The model is updated showing only October –November 2013 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER 2013 - JANUARY 2014 PCE CONCENTRATIONS IN GROUNDWATER

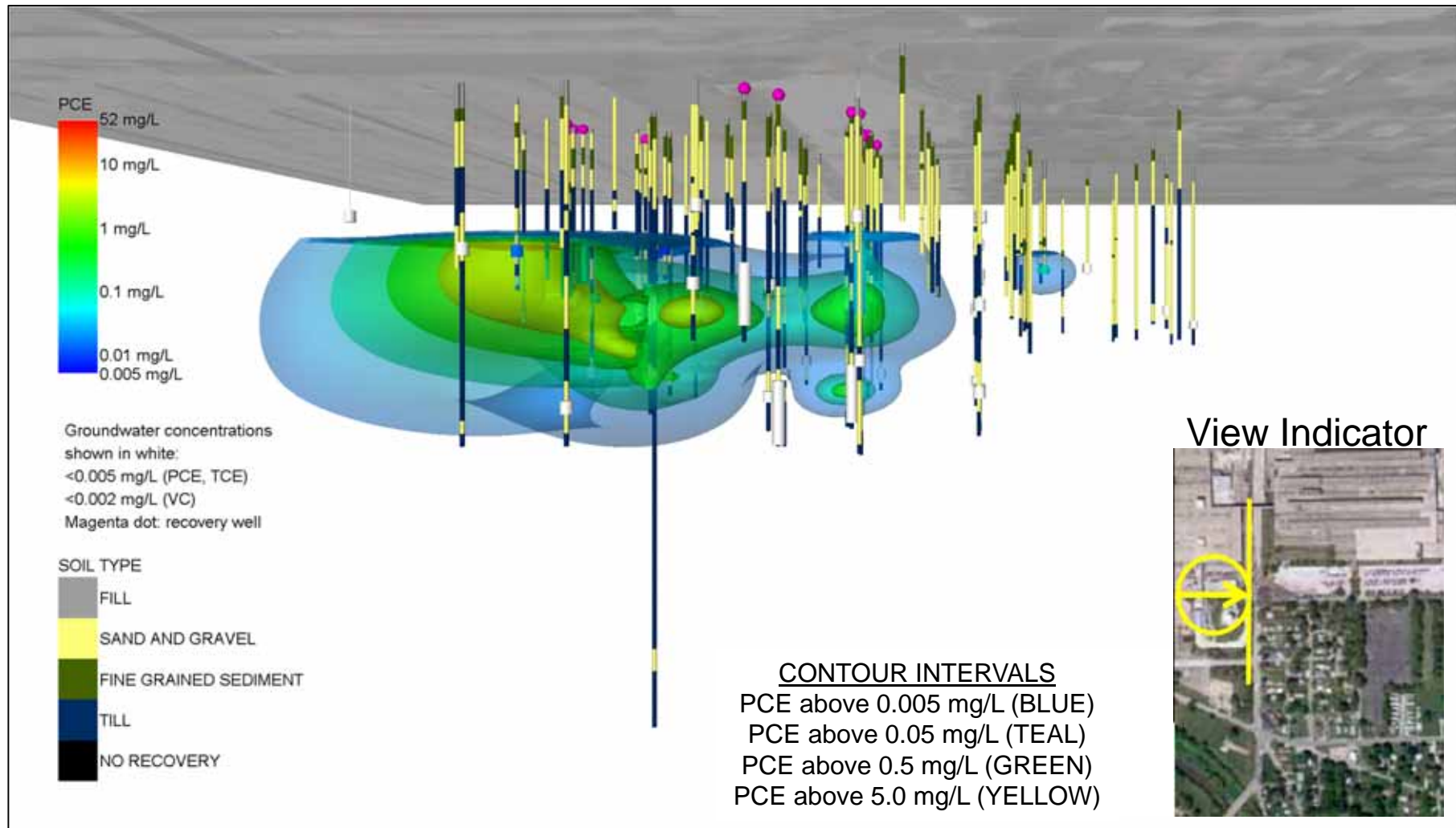
(View from above showing entire depth of model)



NOTE: Recovery wells shown as magenta dot. The model is updated showing only October 2013–January 2014 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER 2012 PCE CONCENTRATIONS IN GROUNDWATER

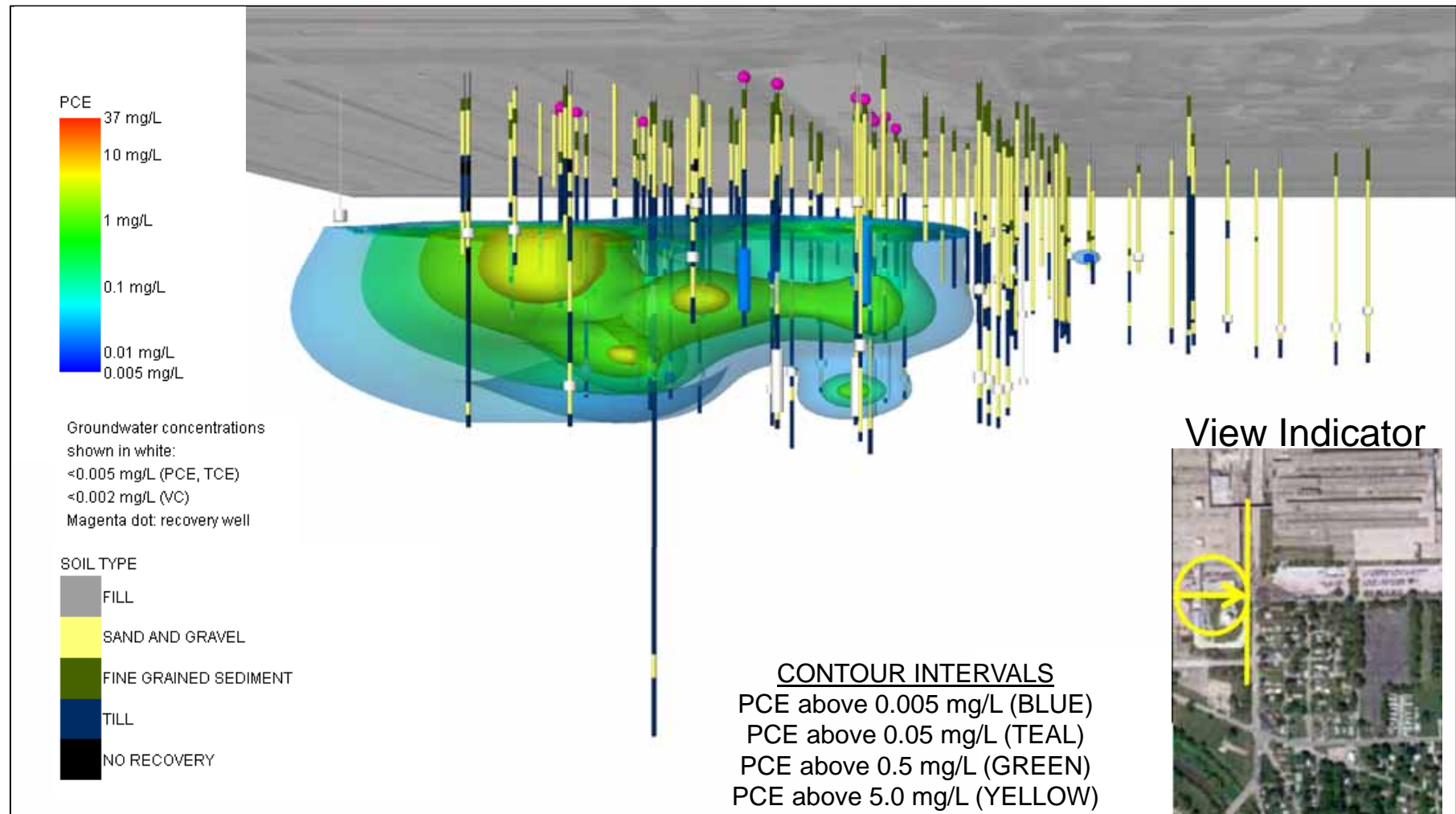
(Looking west to east, from below)



NOTES: Each soil boring and/or monitoring well location used to generate the model is shown above with the appropriate lithology (see symbols above). Additionally, in each case where groundwater analytical results for PCE are below detection limits, 'white' intervals are illustrated in the appropriate sample interval. The model is updated showing only October 2012 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER-NOVEMBER 2013 PCE CONCENTRATIONS IN GROUNDWATER

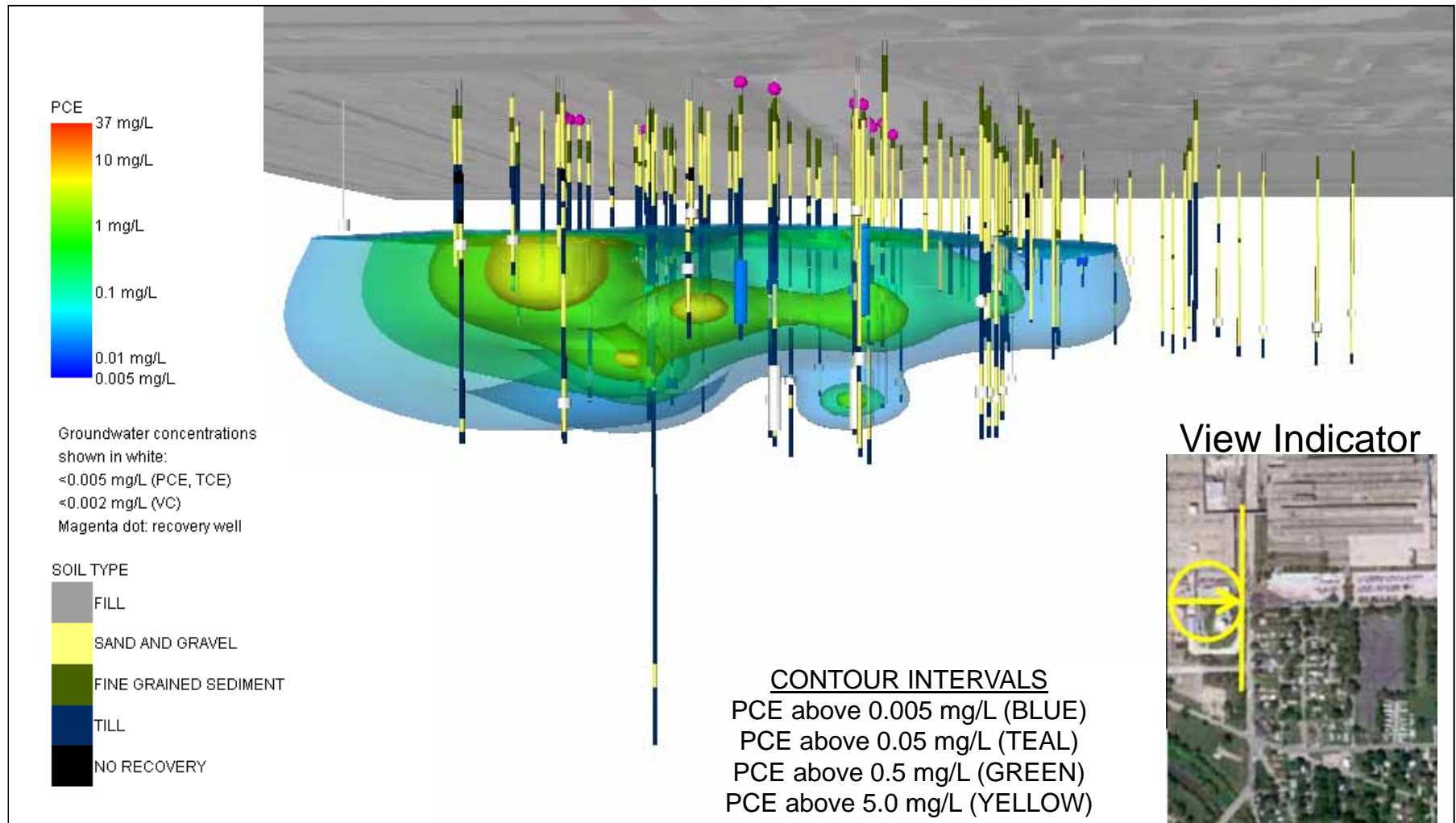
(Looking west to east, from below)



NOTES: Each soil boring and/or monitoring well location used to generate the model is shown above with the appropriate lithology (see symbols above). Additionally, in each case where groundwater analytical results for PCE are below detection limits, 'white' intervals are illustrated in the appropriate sample interval. The model is updated showing only October – November 2013 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER 2013 - JANUARY 2014 PCE CONCENTRATIONS IN GROUNDWATER

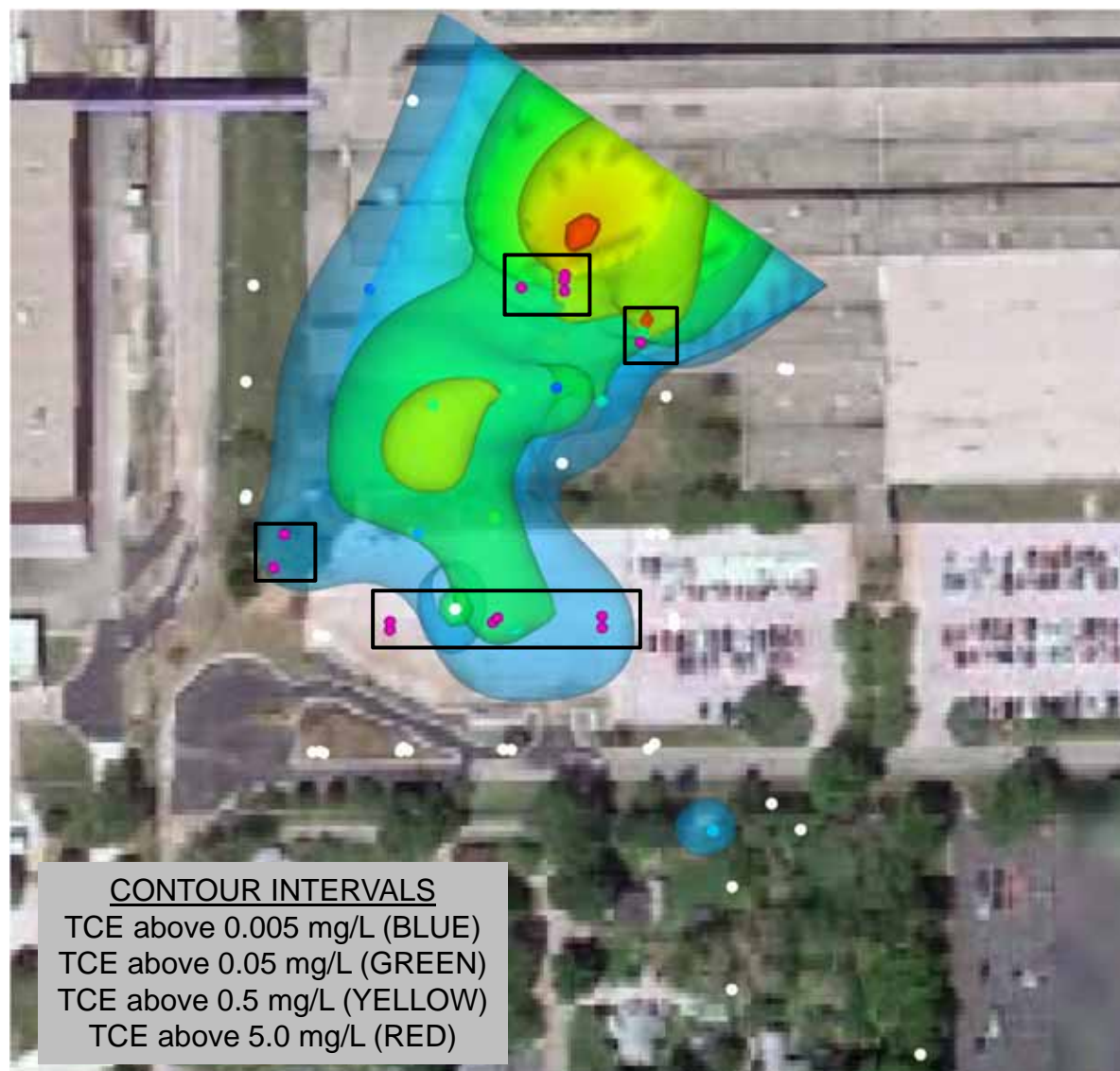
(Looking west to east, from below)



NOTES: Each soil boring and/or monitoring well location used to generate the model is shown above with the appropriate lithology (see symbols above). Additionally, in each case where groundwater analytical results for PCE are below detection limits, 'white' intervals are illustrated in the appropriate sample interval. The model is updated showing only October 2013–January 2014 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER 2012 TCE CONCENTRATIONS IN GROUNDWATER

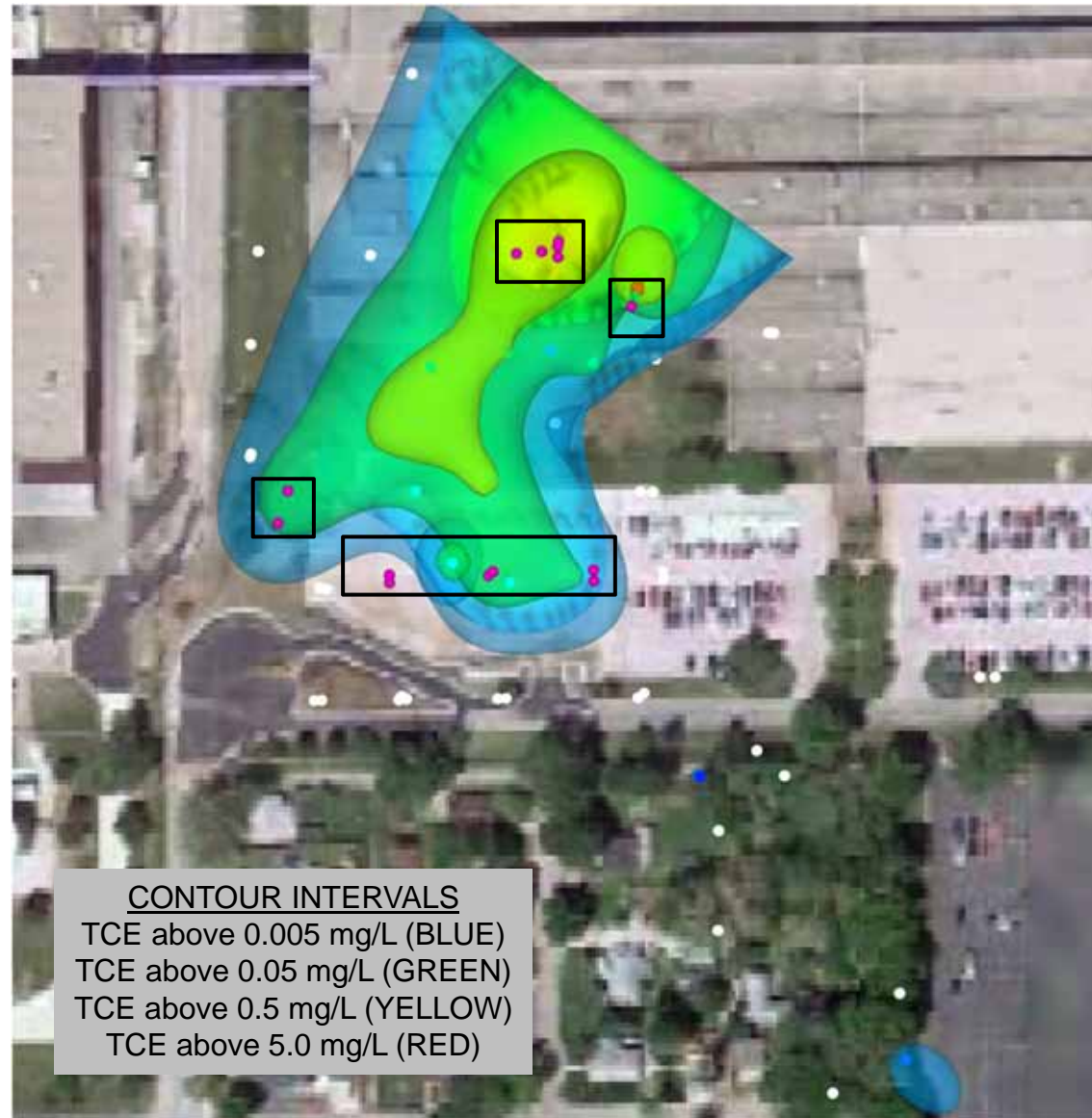
(View from above showing entire depth of model)



NOTE: Recovery wells shown as magenta dot. The model is updated showing only October 2012 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER-NOVEMBER 2013 TCE CONCENTRATIONS IN GROUNDWATER

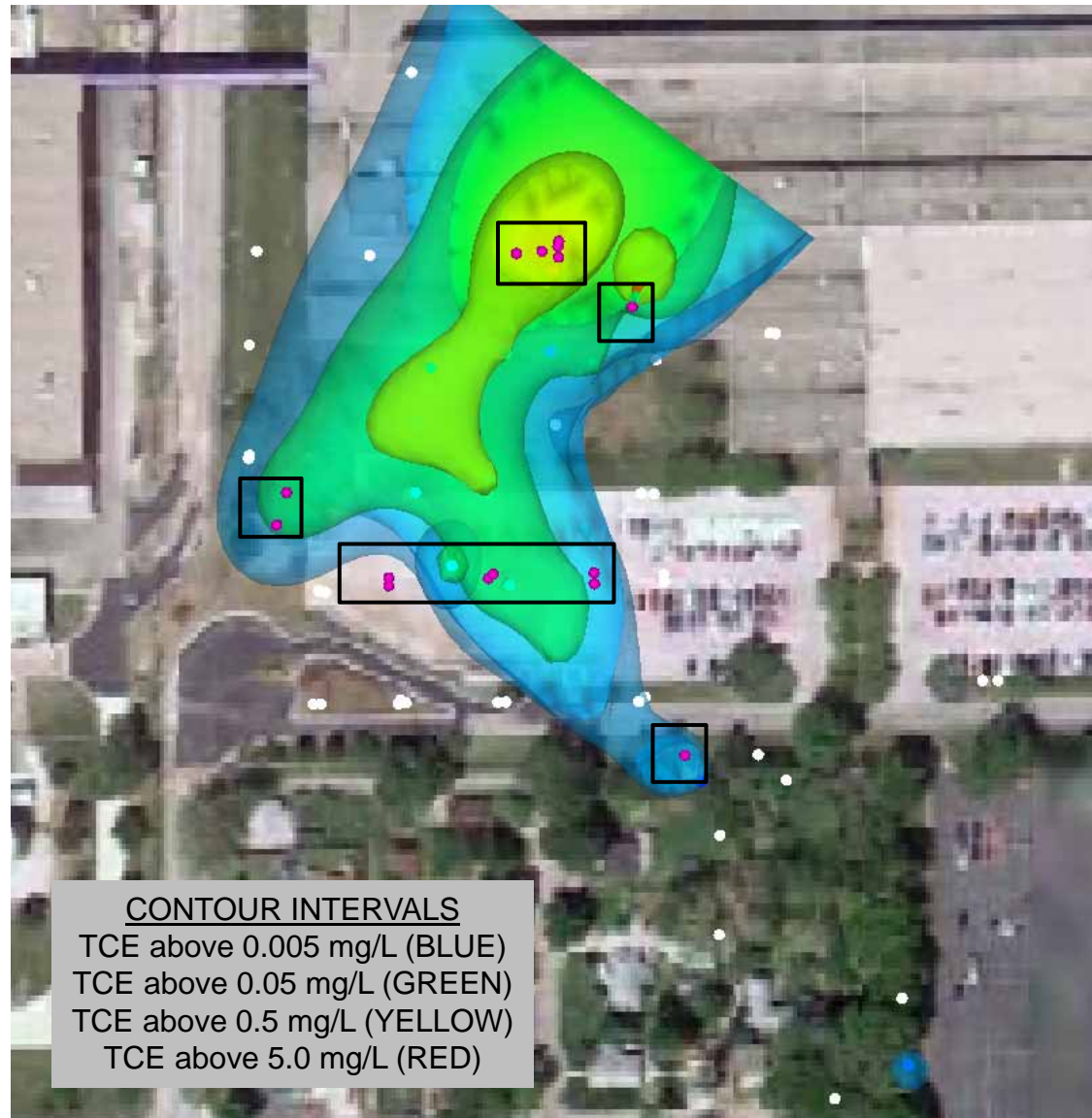
(View from above showing entire depth of model)



NOTE: Recovery wells shown as magenta dot. The model is updated showing only October – November 2013 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER 2013 - JANUARY 2014 TCE CONCENTRATIONS IN GROUNDWATER

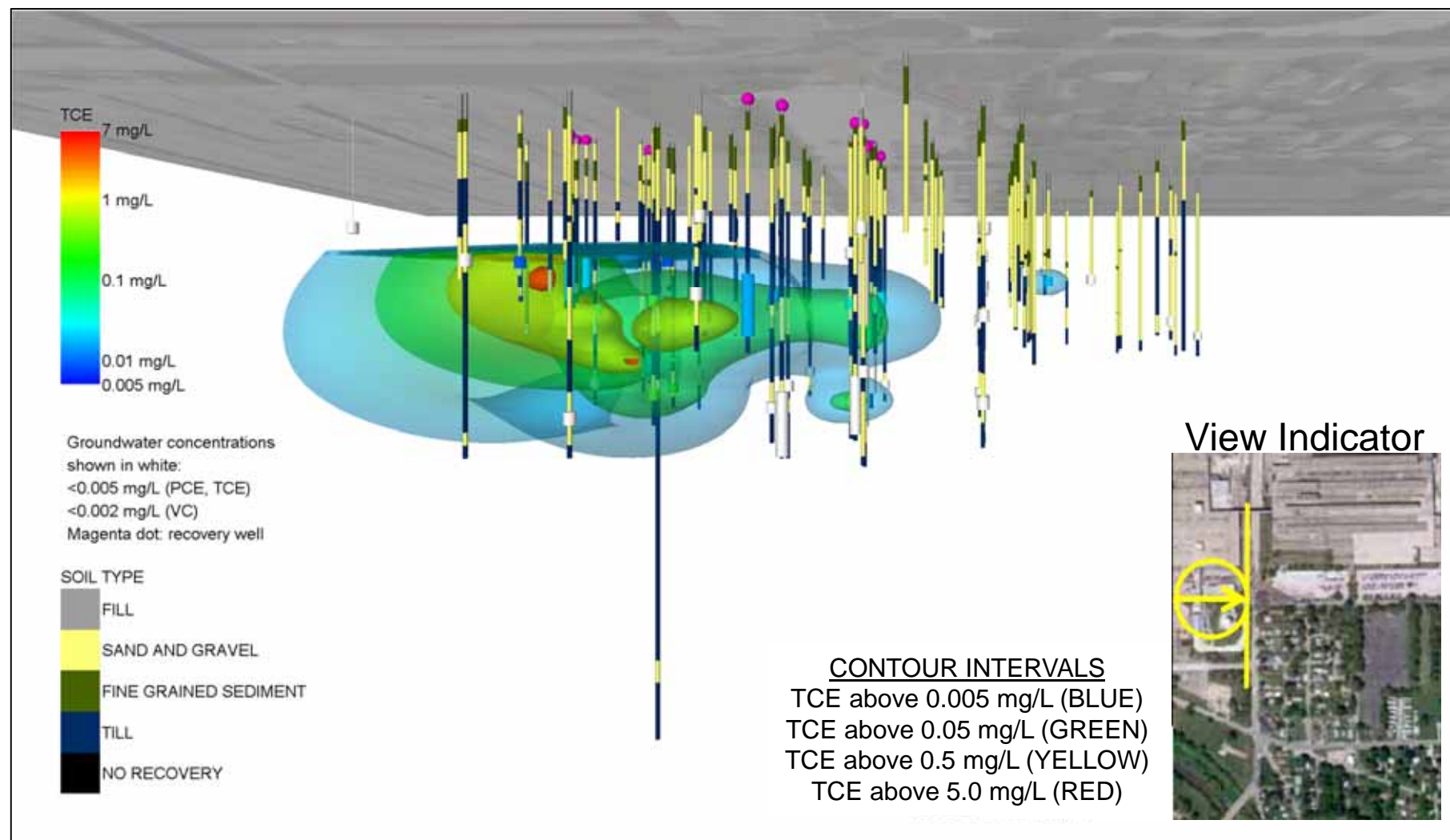
(View from above showing entire depth of model)



NOTE: Recovery wells shown as magenta dot. The model is updated showing only October 2013–January 2014 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER 2012 TCE CONCENTRATIONS IN GROUNDWATER

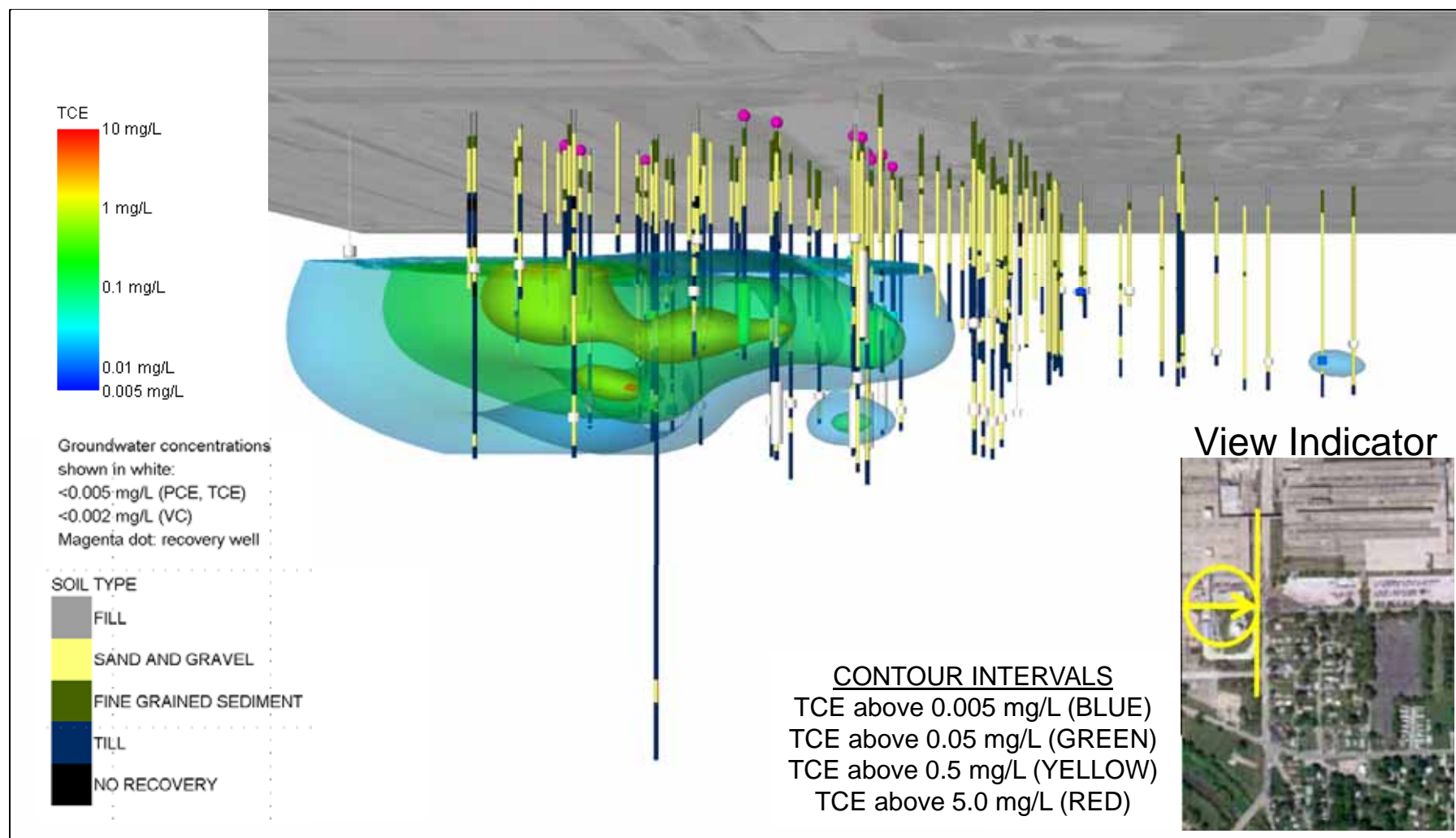
(Looking west to east, from below)



NOTE: Each soil boring and/or monitoring well location used to generate the model is shown above with the appropriate lithology (see symbols above). Additionally, in each case where groundwater analytical results for TCE are below detection limits, 'white' intervals are illustrated in the appropriate sample interval. The model is updated showing only October 2012 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER-NOVEMBER 2013 TCE CONCENTRATIONS IN GROUNDWATER

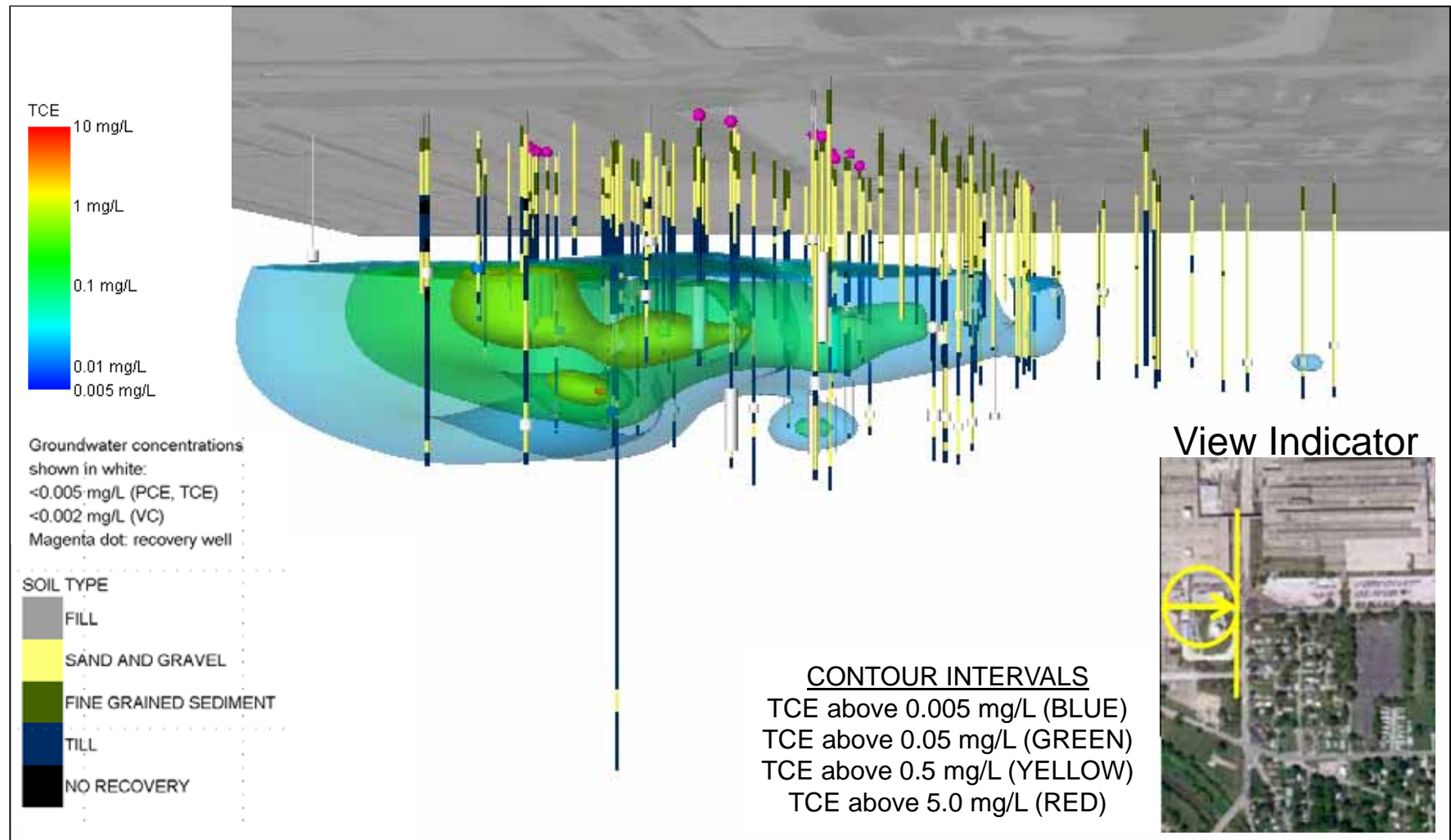
(Looking west to east, from below)



NOTE: Each soil boring and/or monitoring well location used to generate the model is shown above with the appropriate lithology (see symbols above). Additionally, in each case where groundwater analytical results for TCE are below detection limits, 'white' intervals are illustrated in the appropriate sample interval. The model is updated showing only October – November 2013 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER 2013 - JANUARY 2014 TCE CONCENTRATIONS IN GROUNDWATER

(Looking west to east, from below)



NOTE: Each soil boring and/or monitoring well location used to generate the model is shown above with the appropriate lithology (see symbols above). Additionally, in each case where groundwater analytical results for TCE are below detection limits, 'white' intervals are illustrated in the appropriate sample interval. The model is updated showing only October 2013–January 2014 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER 2012 VC CONCENTRATIONS IN GROUNDWATER

(View from above showing entire depth of model)



NOTE: Recovery wells shown as magenta dot. The model is updated showing only October 2012 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER-NOVEMBER 2013 VC CONCENTRATIONS IN GROUNDWATER

(View from above showing entire depth of model)



NOTE: Recovery wells shown as magenta dot. The model is updated showing only October – November 2013 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER 2013 - JANUARY 2014 VC CONCENTRATIONS IN GROUNDWATER

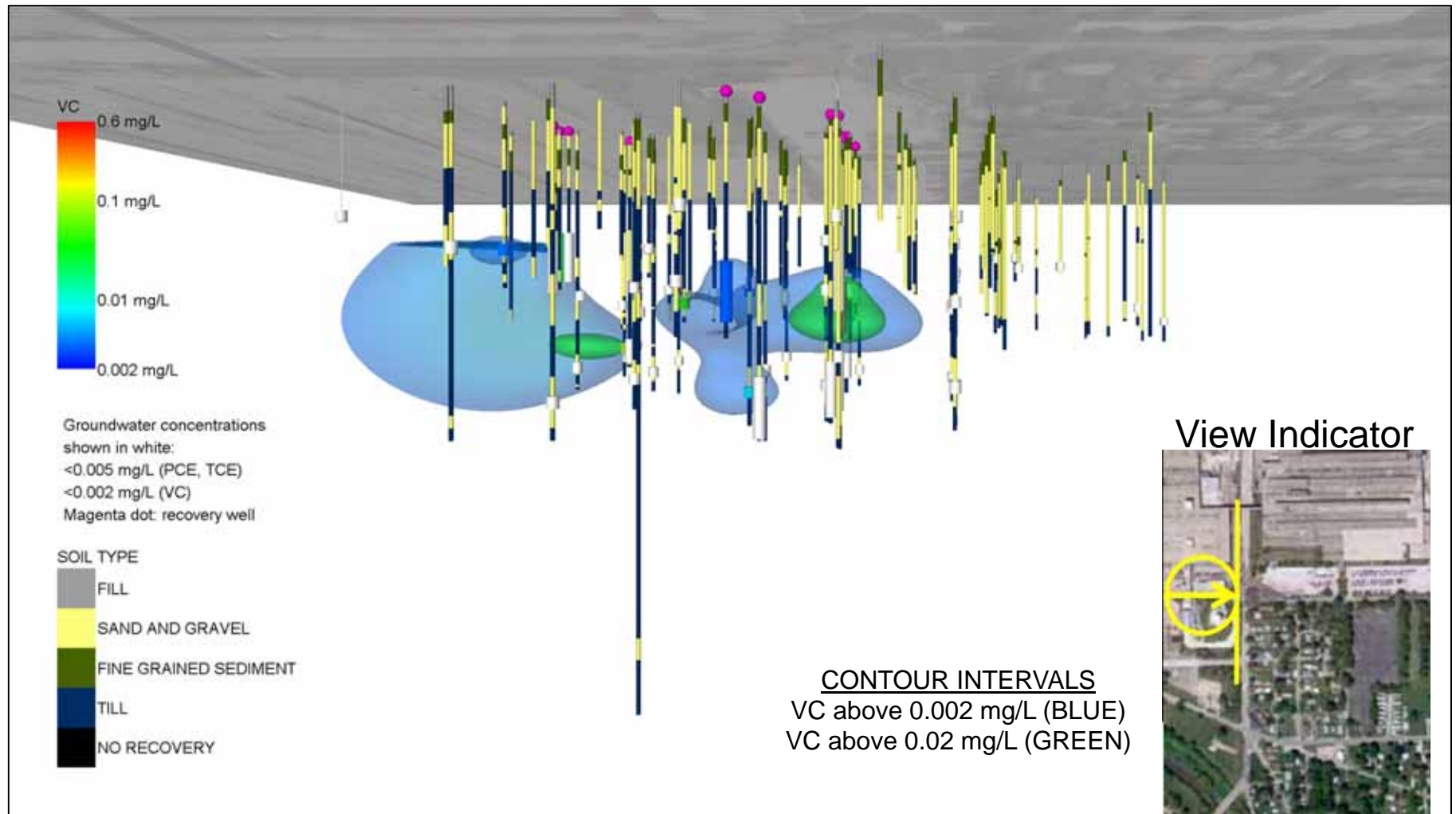
(View from above showing entire depth of model)



NOTE: Recovery wells shown as magenta dot. The model is updated showing only October 2013–January 2014 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER 2012 VC CONCENTRATIONS IN GROUNDWATER

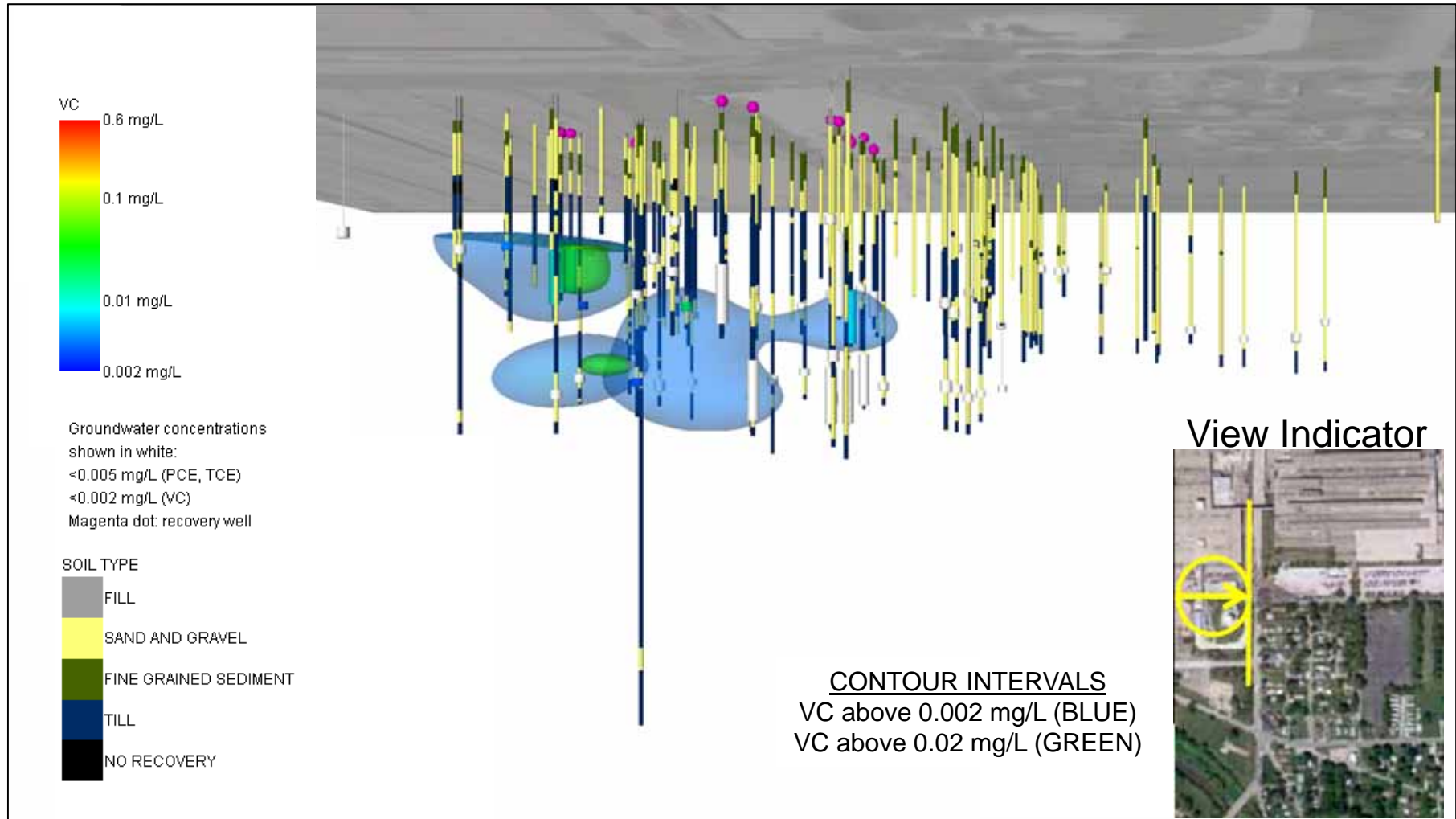
(Looking west to east, from below)



NOTE: Each soil boring and/or monitoring well location used to generate the model is shown above with the appropriate lithology (see symbols above). Additionally, in each case where groundwater analytical results for VC are below detection limits, 'white' intervals are illustrated in the appropriate sample interval. The model is updated showing only October 2012 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER-NOVEMBER 2013 VC CONCENTRATIONS IN GROUNDWATER

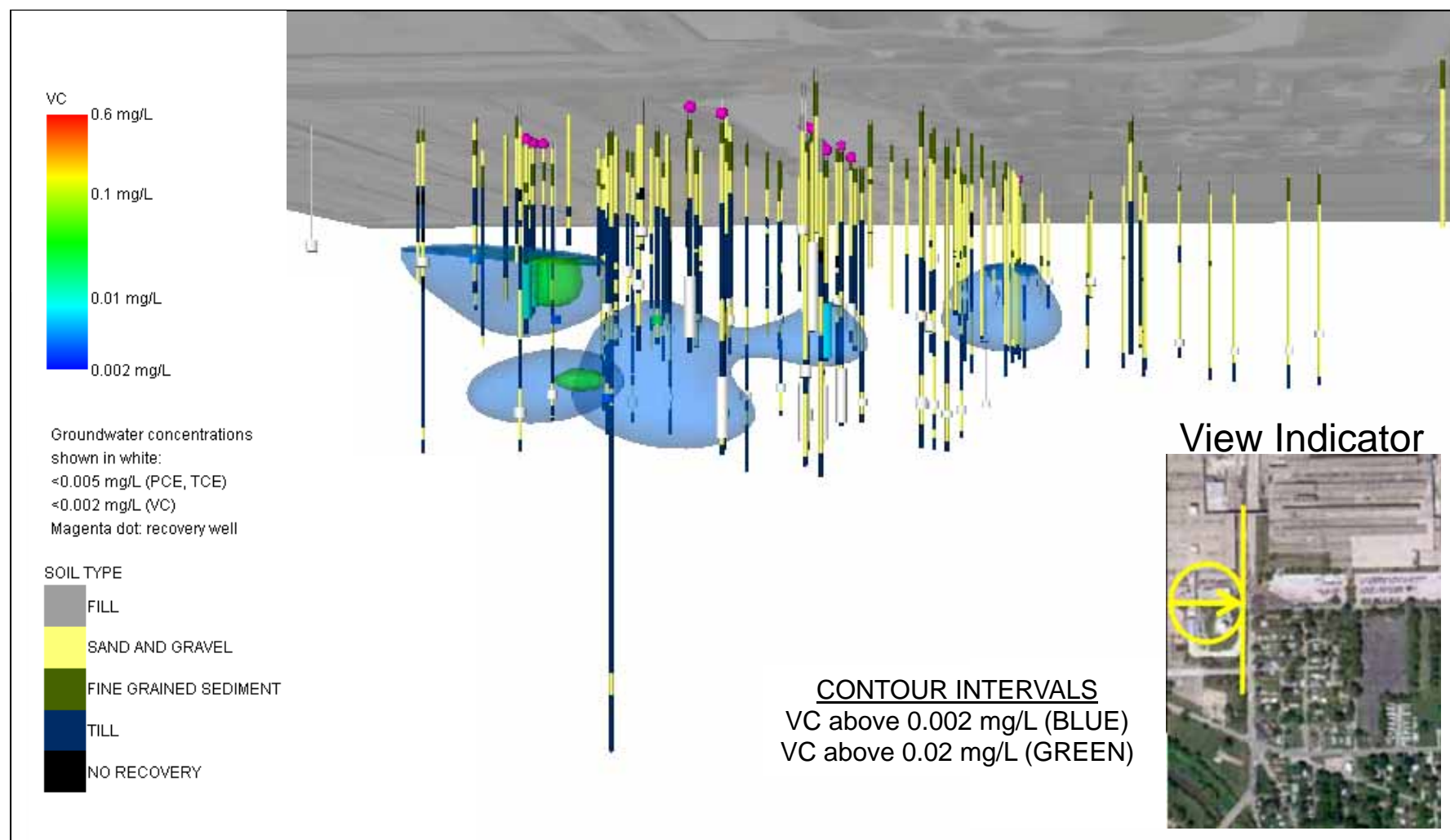
(Looking west to east, from below)



NOTE: Each soil boring and/or monitoring well location used to generate the model is shown above with the appropriate lithology (see symbols above). Additionally, in each case where groundwater analytical results for VC are below detection limits, 'white' intervals are illustrated in the appropriate sample interval. The model is updated showing only October – November 2013 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

OCTOBER 2013 - JANUARY 2014 VC CONCENTRATIONS IN GROUNDWATER

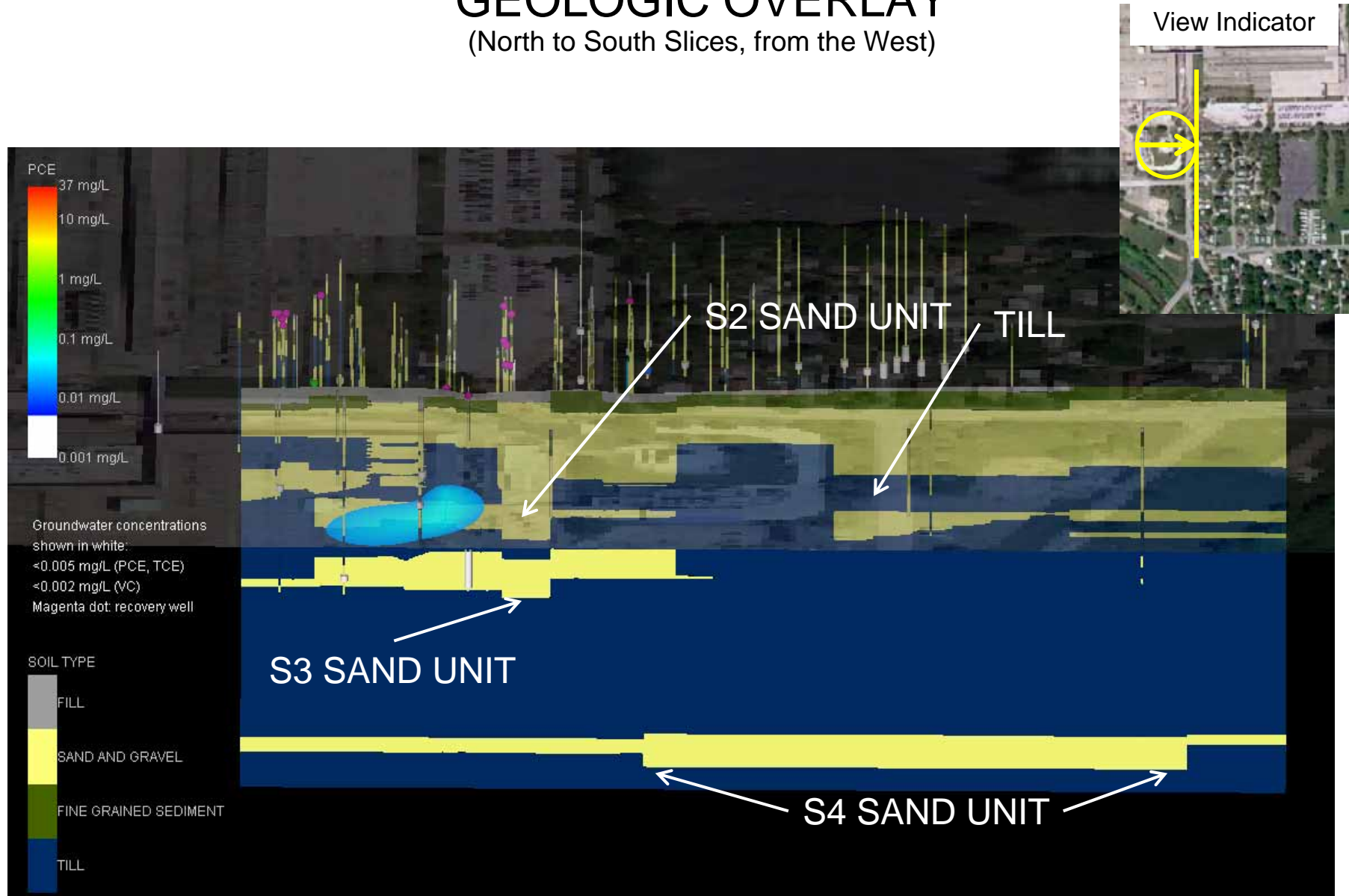
(Looking west to east, from below)



NOTE: Each soil boring and/or monitoring well location used to generate the model is shown above with the appropriate lithology (see symbols above). Additionally, in each case where groundwater analytical results for VC are below detection limits, 'white' intervals are illustrated in the appropriate sample interval. The model is updated showing only October 2013–January 2014 groundwater analytical data from monitoring and recovery wells (the most recent data for this time period is used for wells sampled more than once).

PCE CONCENTRATIONS IN GROUNDWATER WITH GEOLOGIC OVERLAY

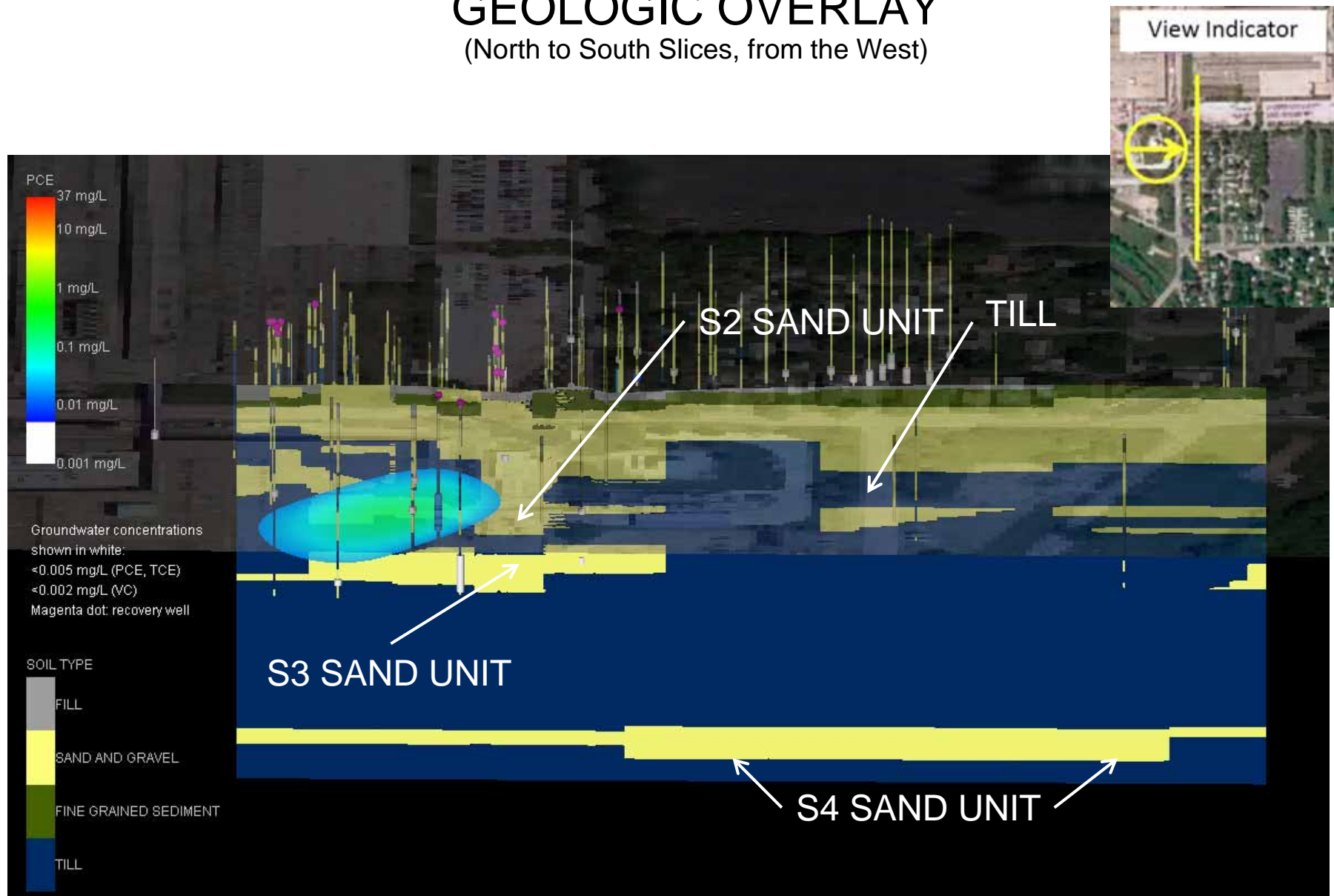
(North to South Slices, from the West)



NOTE: Each soil boring and/or monitoring well location used to generate the model is shown above with the appropriate lithology (see symbols above). PCE plume data comes from October 2013-January 2014 GW analytical results. Additionally, in each case where soil and or borehole/groundwater analytical results for PCE are below detection limits, 'white' intervals are illustrated in the appropriate sample interval.

PCE CONCENTRATIONS IN GROUNDWATER WITH GEOLOGIC OVERLAY

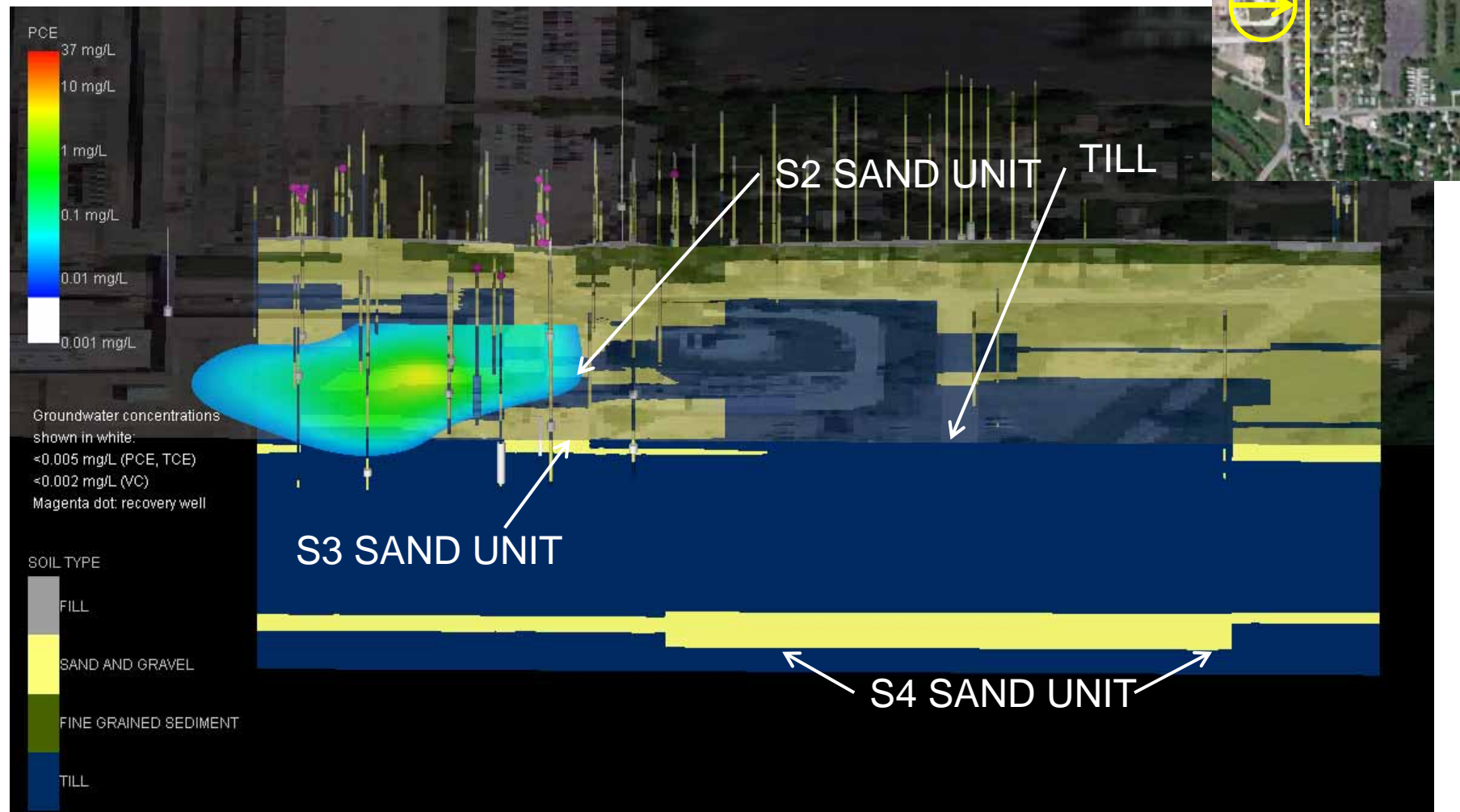
(North to South Slices, from the West)



NOTE: Each soil boring and/or monitoring well location used to generate the model is shown above with the appropriate lithology (see symbols above). PCE plume data comes from October 2013-January 2014 GW analytical results. Additionally, in each case where soil and or borehole/groundwater analytical results for PCE are below detection limits, 'white' intervals are illustrated in the appropriate sample interval.

PCE CONCENTRATIONS IN GROUNDWATER WITH GEOLOGIC OVERLAY

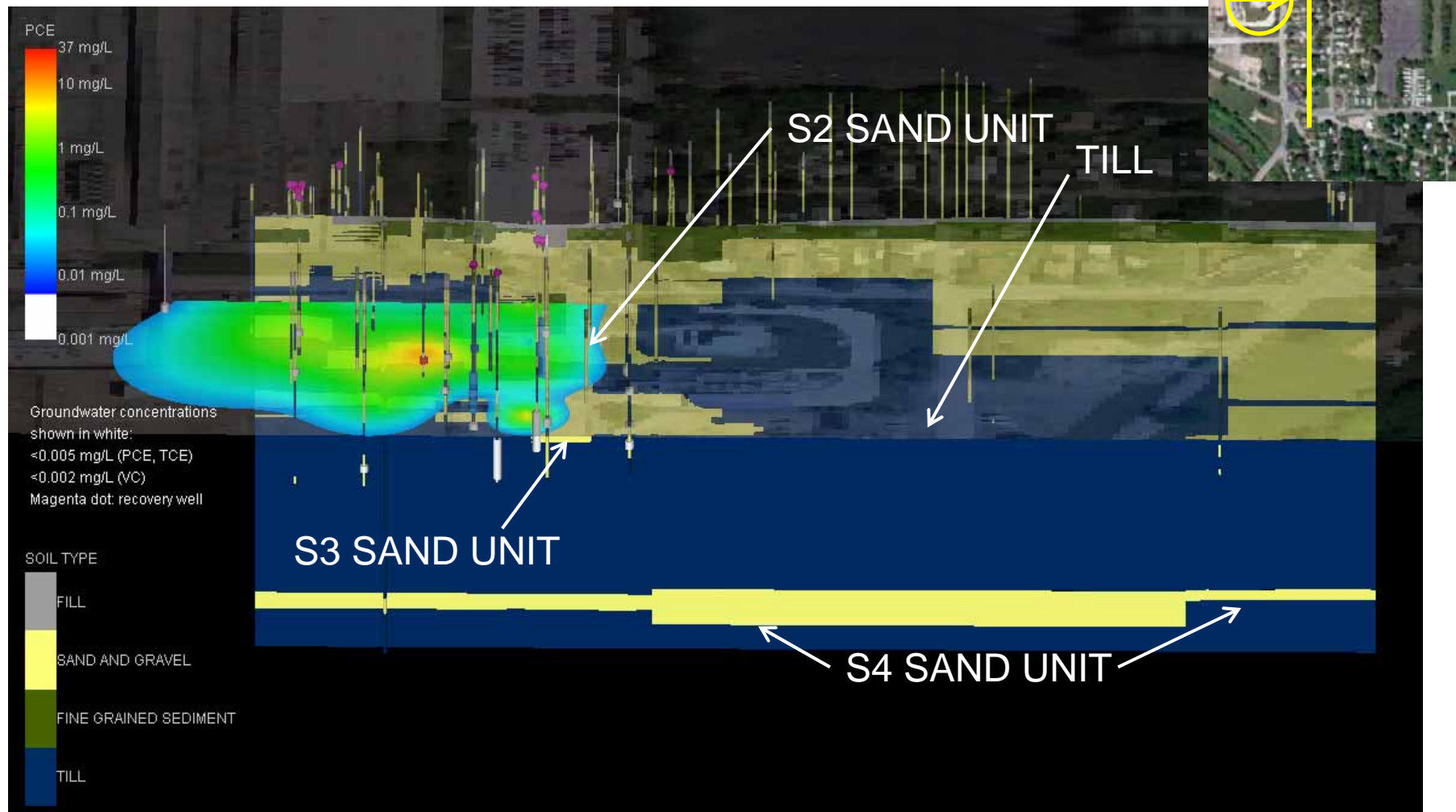
(North to South Slices, from the West)



NOTE: Each soil boring and/or monitoring well location used to generate the model is shown above with the appropriate lithology (see symbols above). PCE plume data comes from October 2013-January 2014 GW analytical results. Additionally, in each case where soil and or borehole/groundwater analytical results for PCE are below detection limits, 'white' intervals are illustrated in the appropriate sample interval.

PCE CONCENTRATIONS IN GROUNDWATER WITH GEOLOGIC OVERLAY

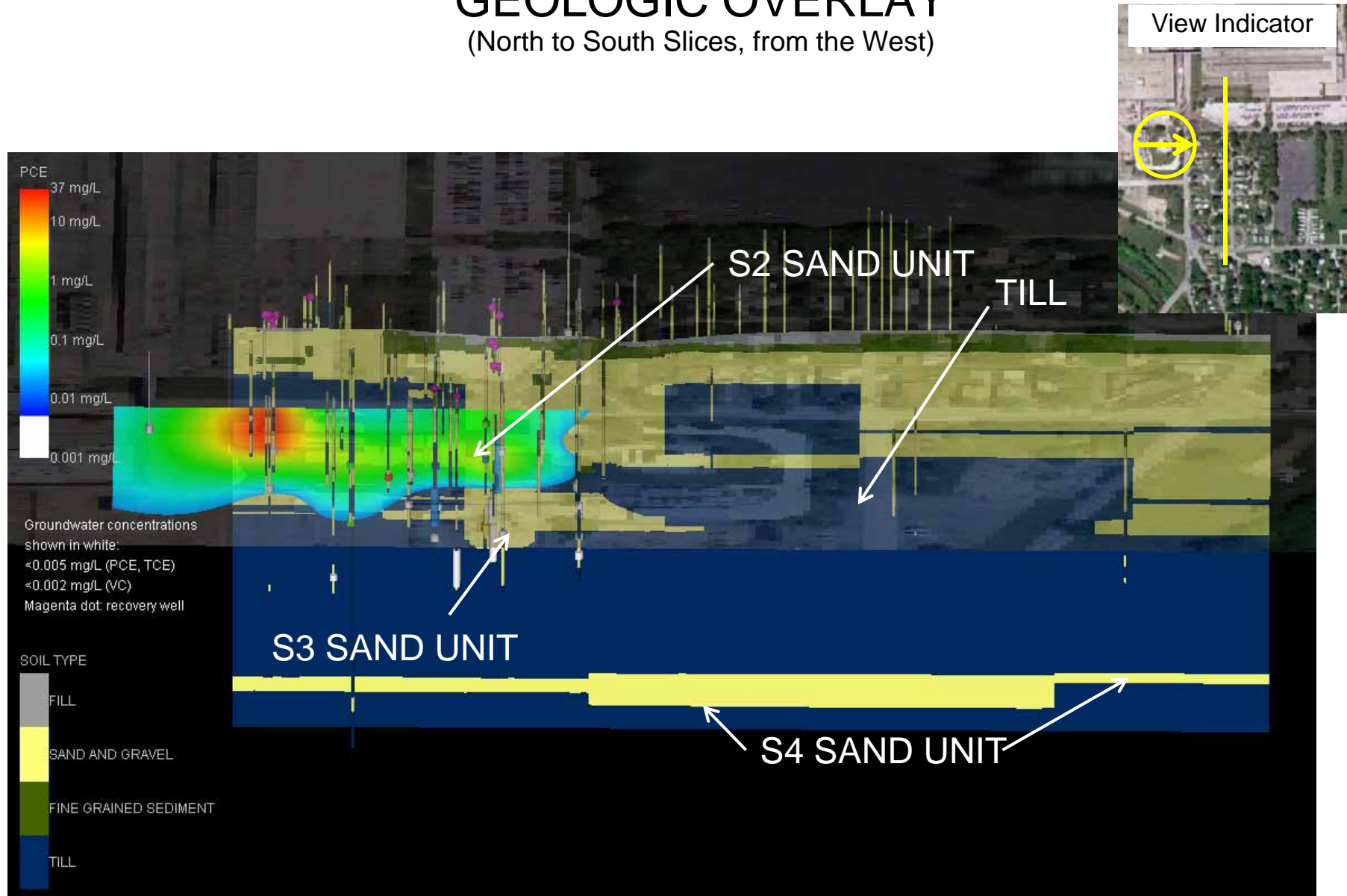
(North to South Slices, from the West)



NOTE: Each soil boring and/or monitoring well location used to generate the model is shown above with the appropriate lithology (see symbols above). PCE plume data comes from October 2013-January 2014 GW analytical results. Additionally, in each case where soil and or borehole/groundwater analytical results for PCE are below detection limits, 'white' intervals are illustrated in the appropriate sample interval.

PCE CONCENTRATIONS IN GROUNDWATER WITH GEOLOGIC OVERLAY

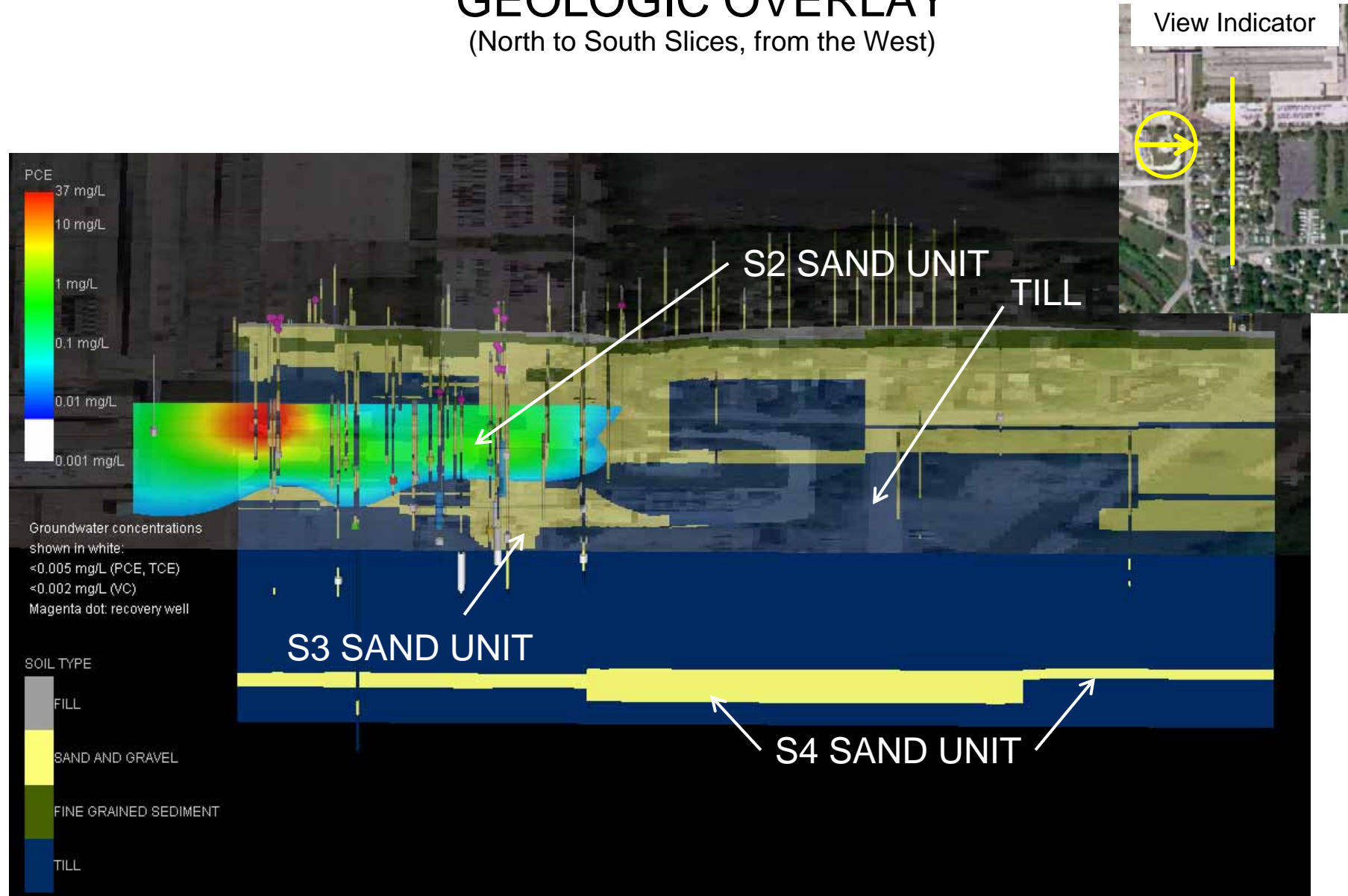
(North to South Slices, from the West)



NOTE: Each soil boring and/or monitoring well location used to generate the model is shown above with the appropriate lithology (see symbols above). PCE plume data comes from October 2013-January 2014 GW analytical results. Additionally, in each case where soil and or borehole/groundwater analytical results for PCE are below detection limits, 'white' intervals are illustrated in the appropriate sample interval.

PCE CONCENTRATIONS IN GROUNDWATER WITH GEOLOGIC OVERLAY

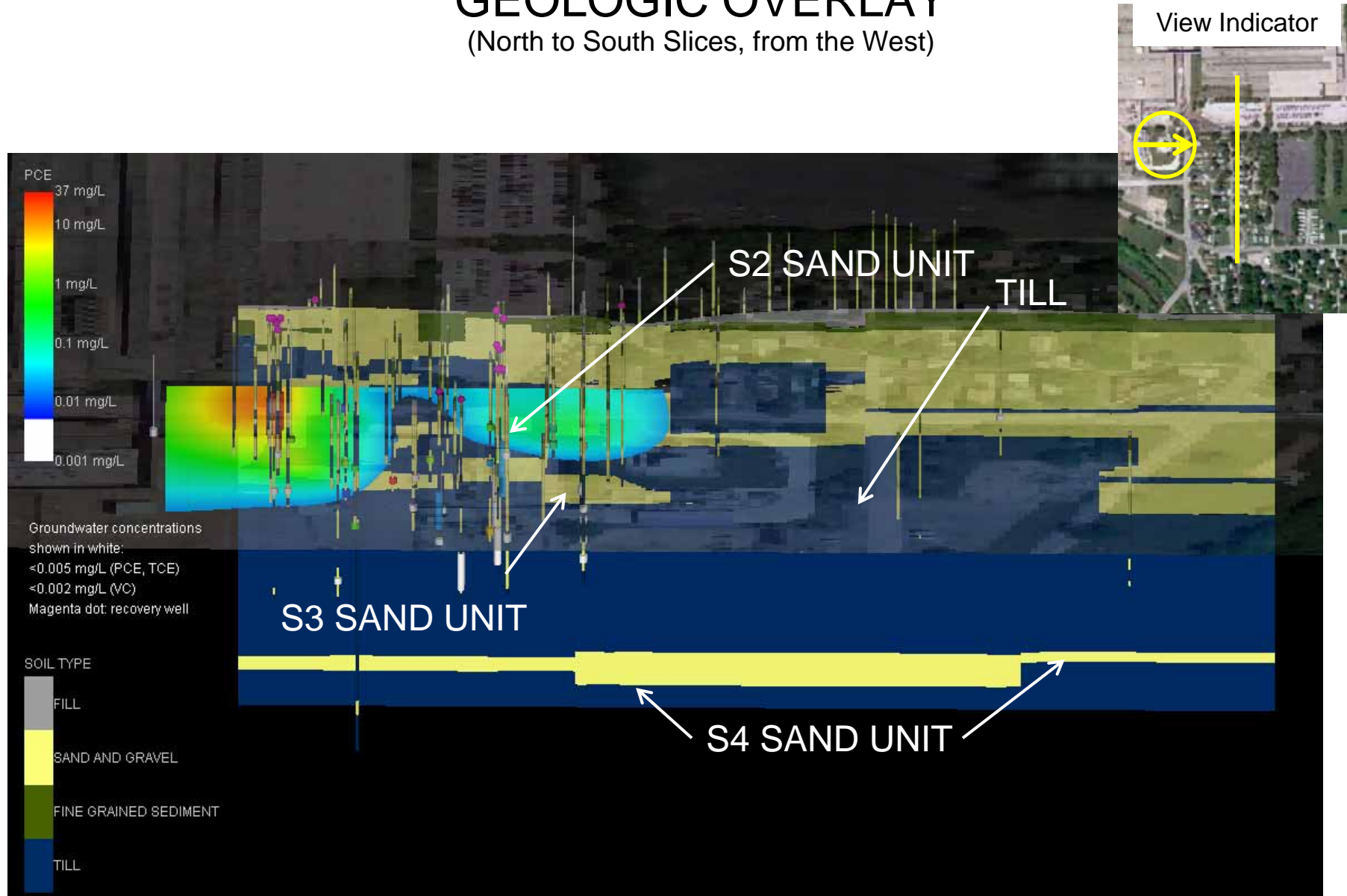
(North to South Slices, from the West)



NOTE: Each soil boring and/or monitoring well location used to generate the model is shown above with the appropriate lithology (see symbols above). PCE plume data comes from October 2013-January 2014 GW analytical results. Additionally, in each case where soil and or borehole/groundwater analytical results for PCE are below detection limits, 'white' intervals are illustrated in the appropriate sample interval.

PCE CONCENTRATIONS IN GROUNDWATER WITH GEOLOGIC OVERLAY

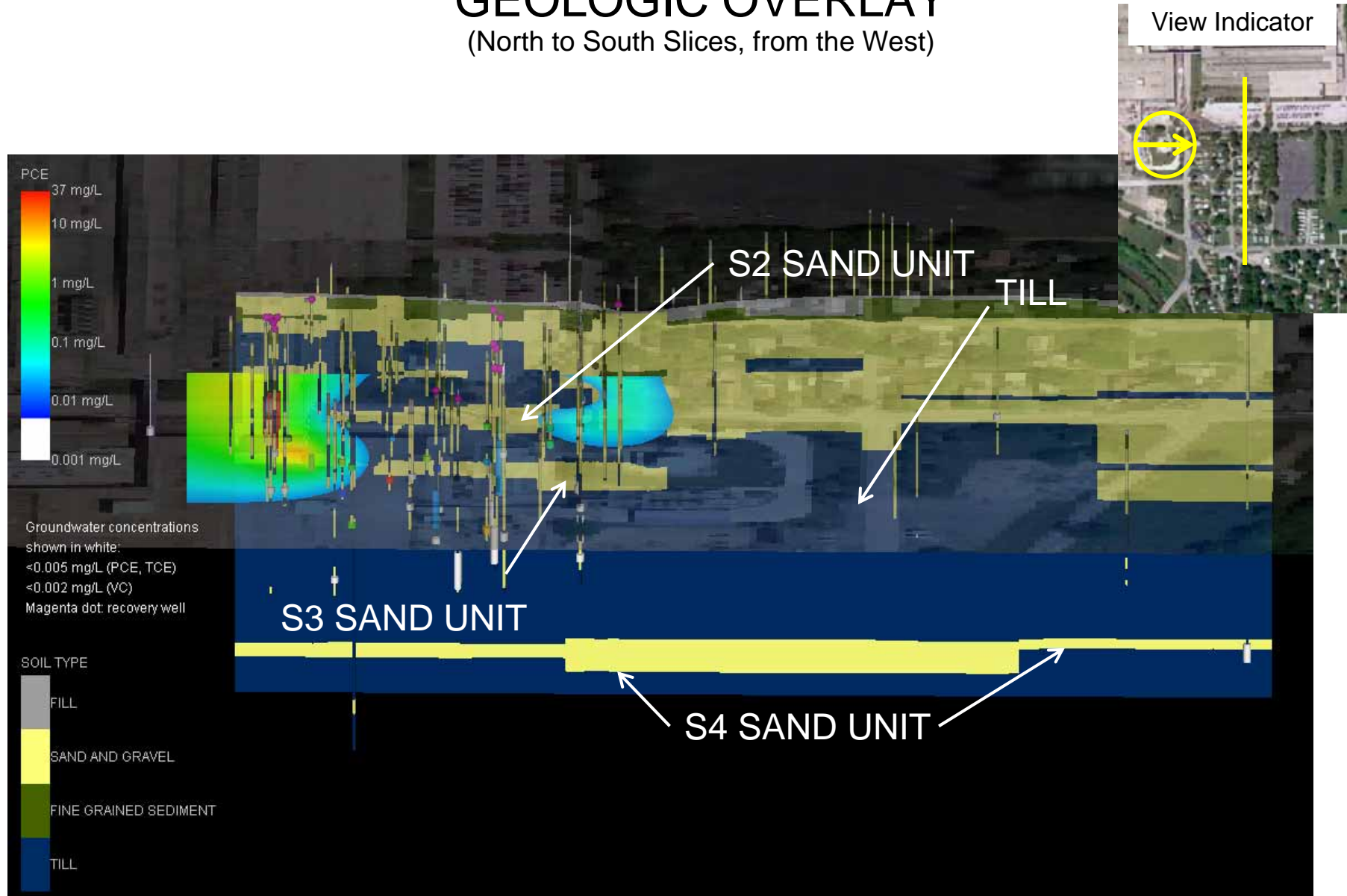
(North to South Slices, from the West)



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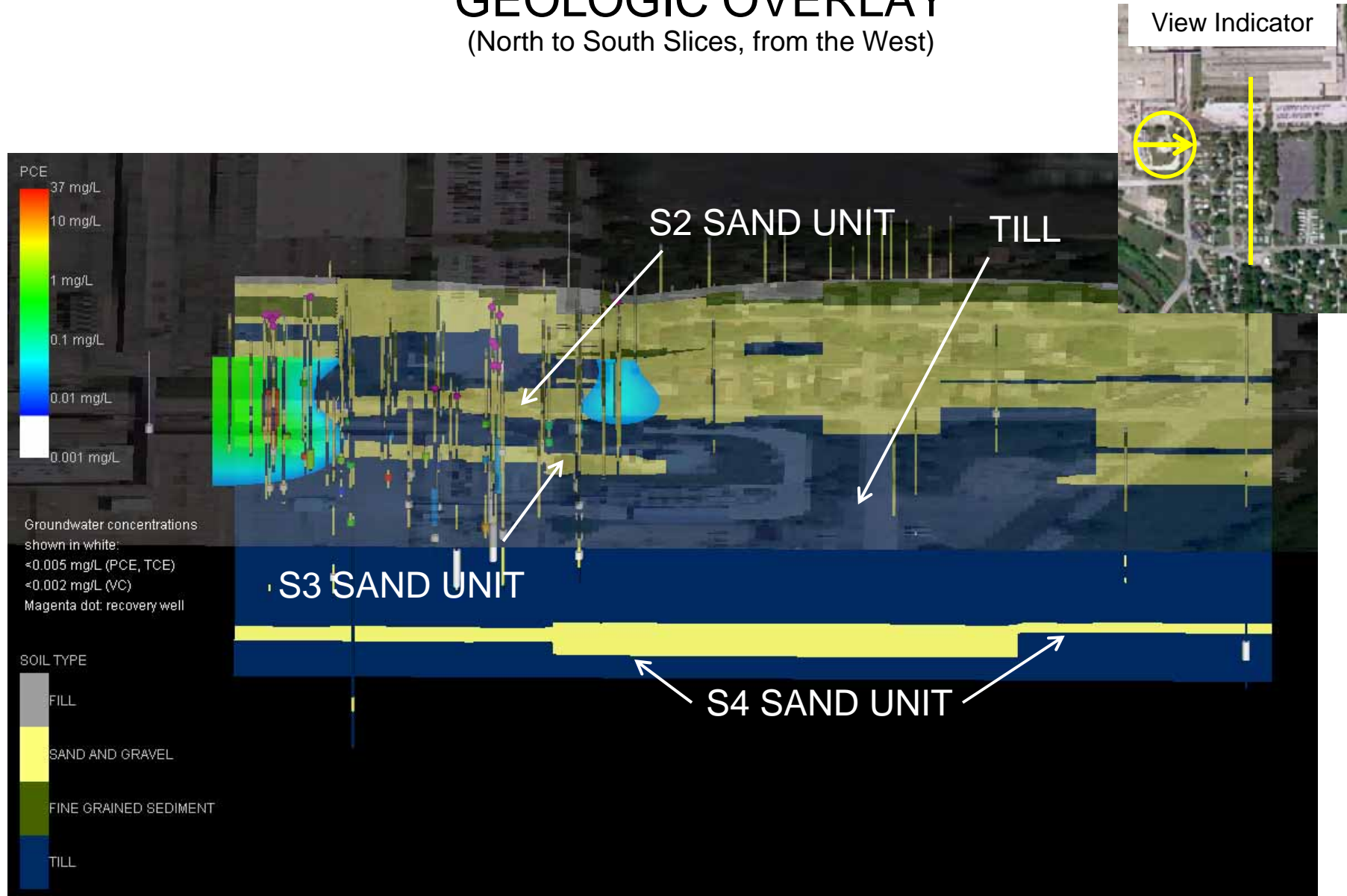
(North to South Slices, from the West)



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PCE CONCENTRATIONS IN GROUNDWATER WITH GEOLOGIC OVERLAY

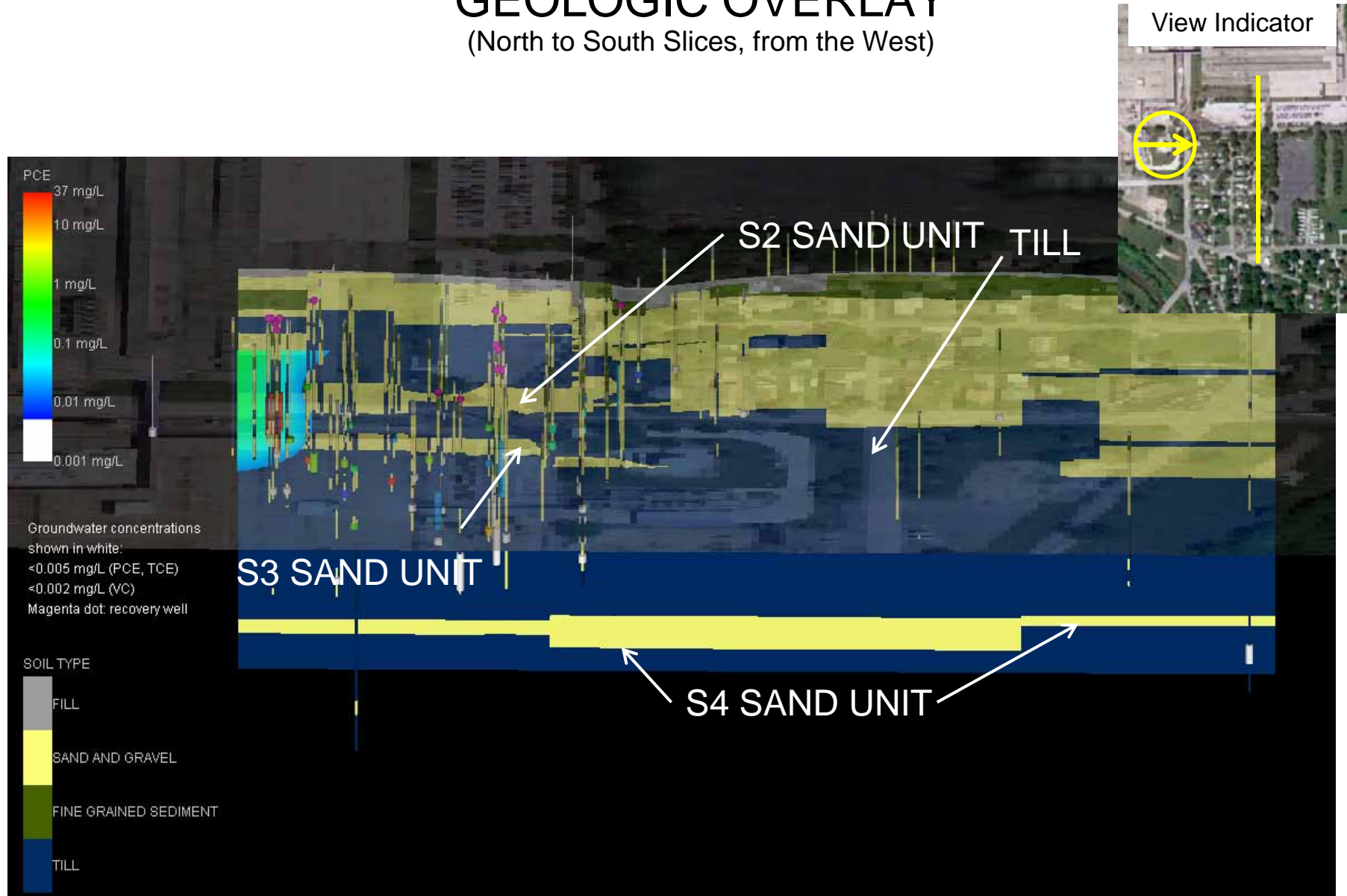
(North to South Slices, from the West)



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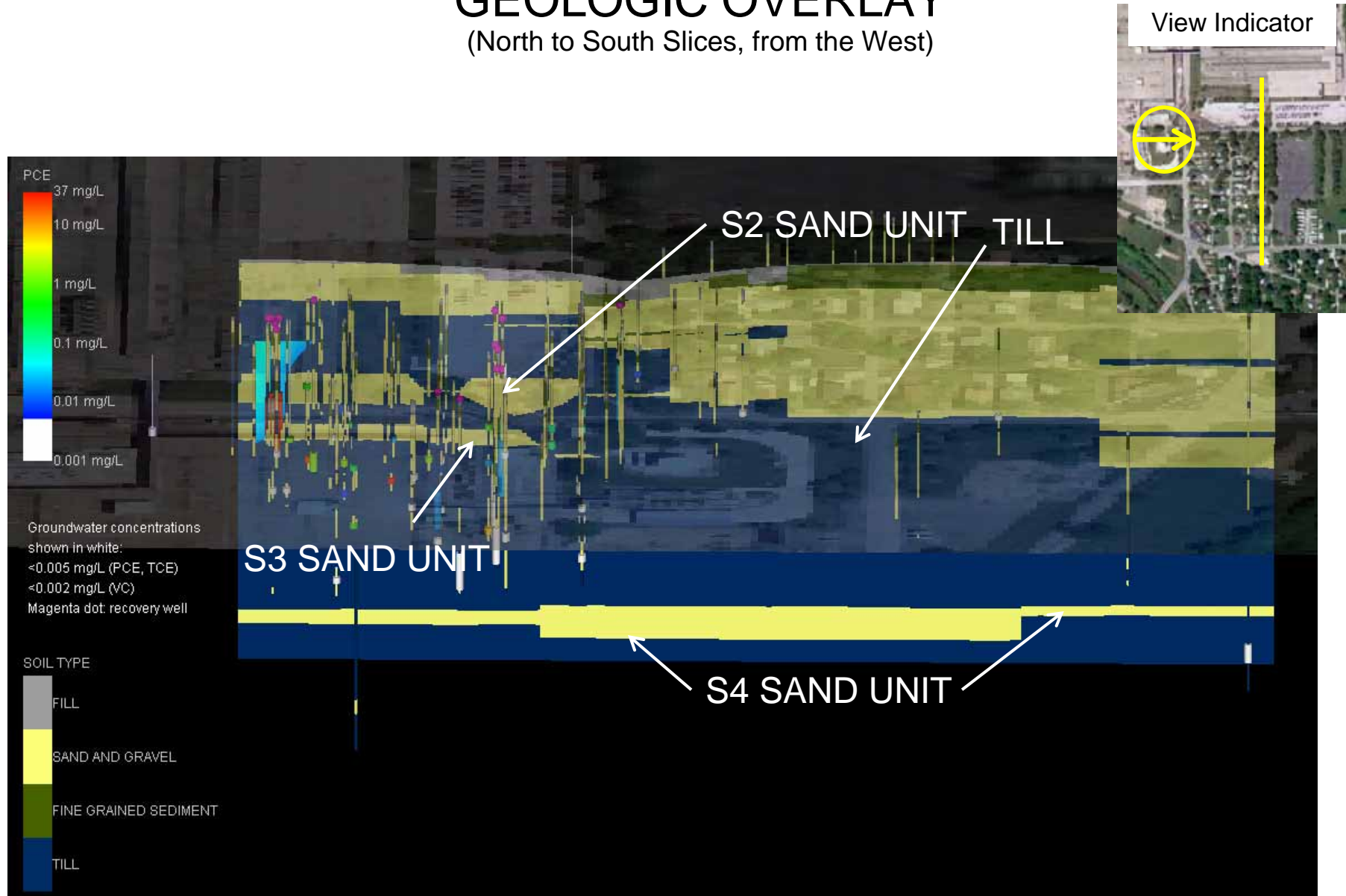
(North to South Slices, from the West)



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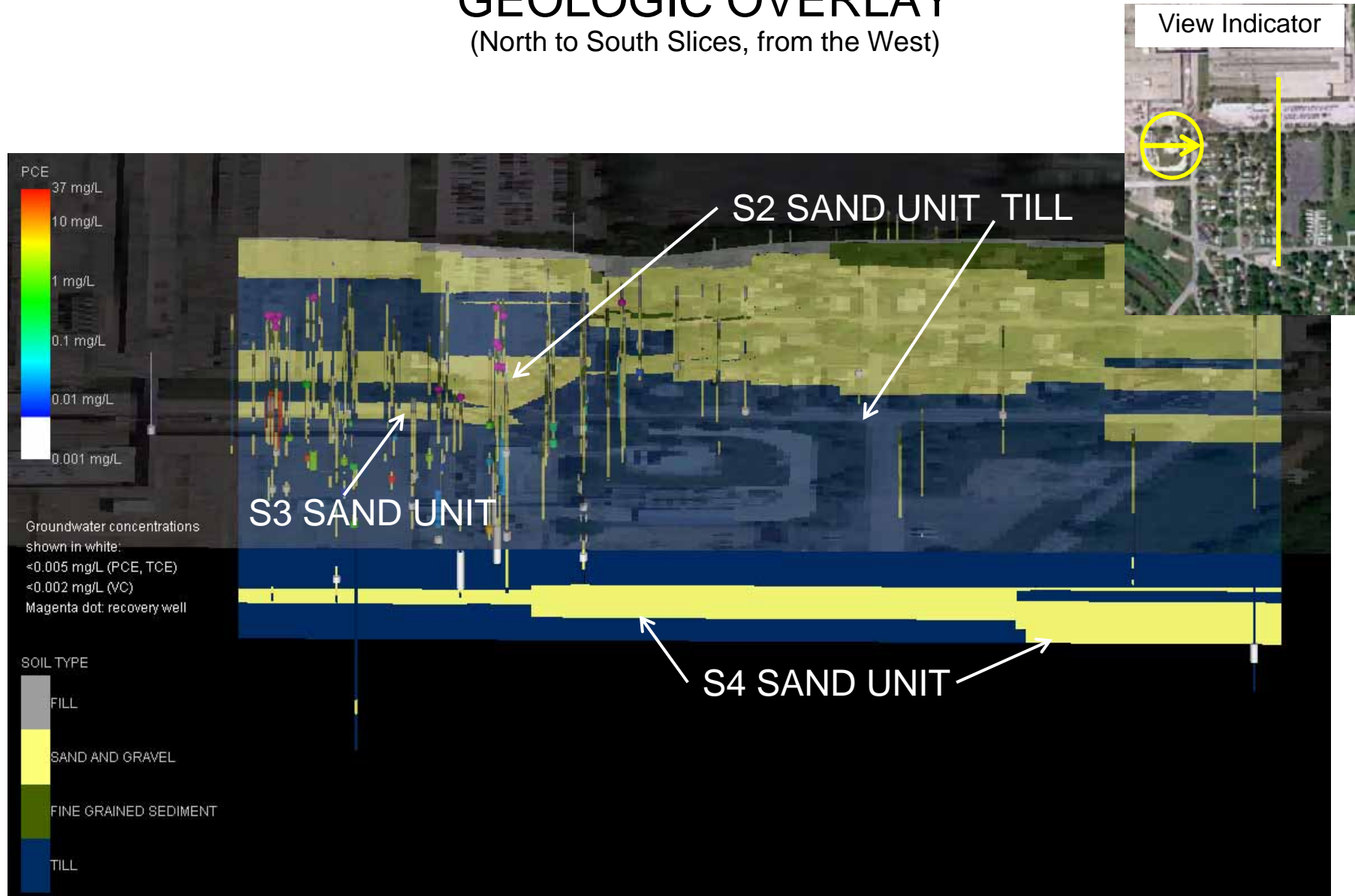
(North to South Slices, from the West)



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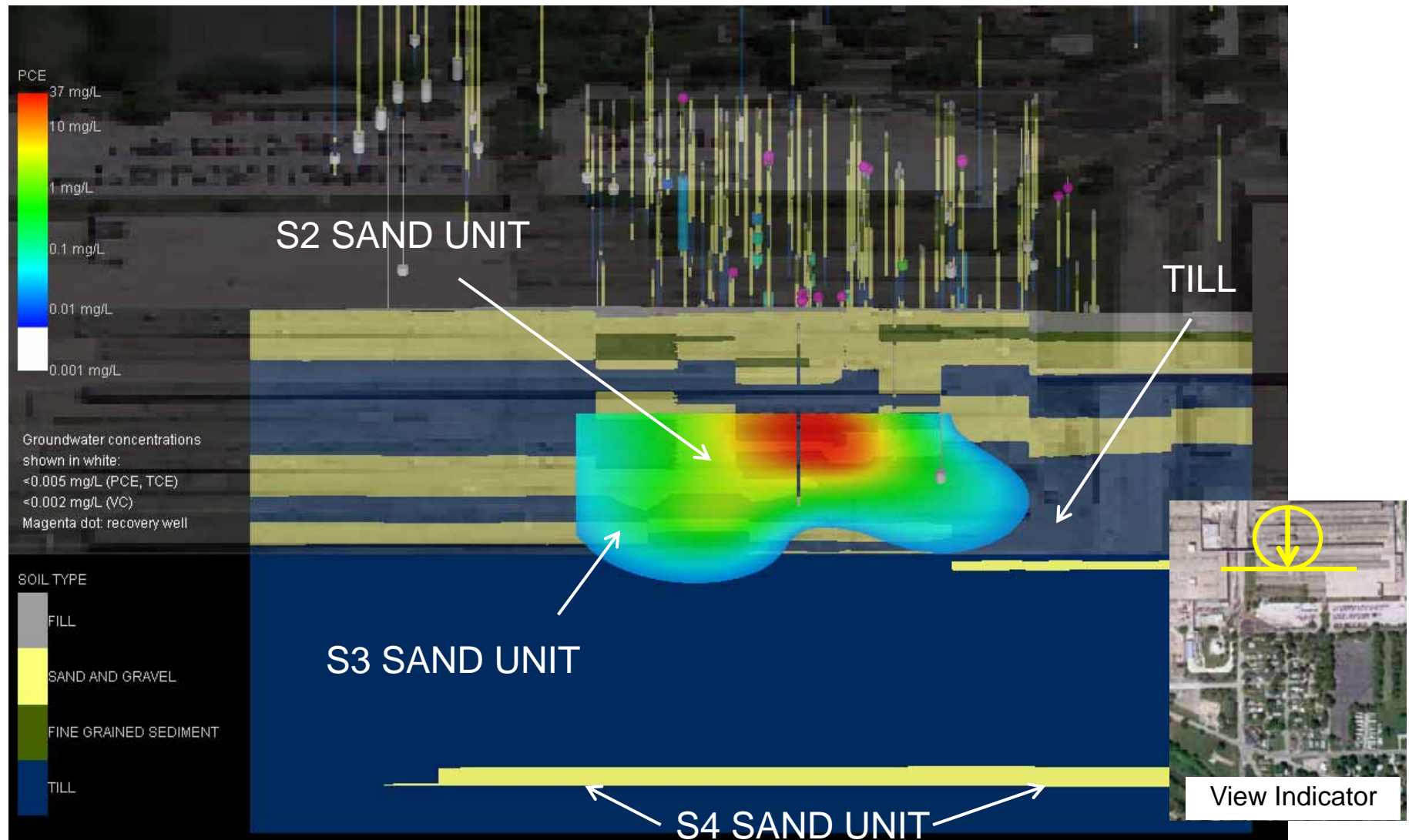
(North to South Slices, from the West)



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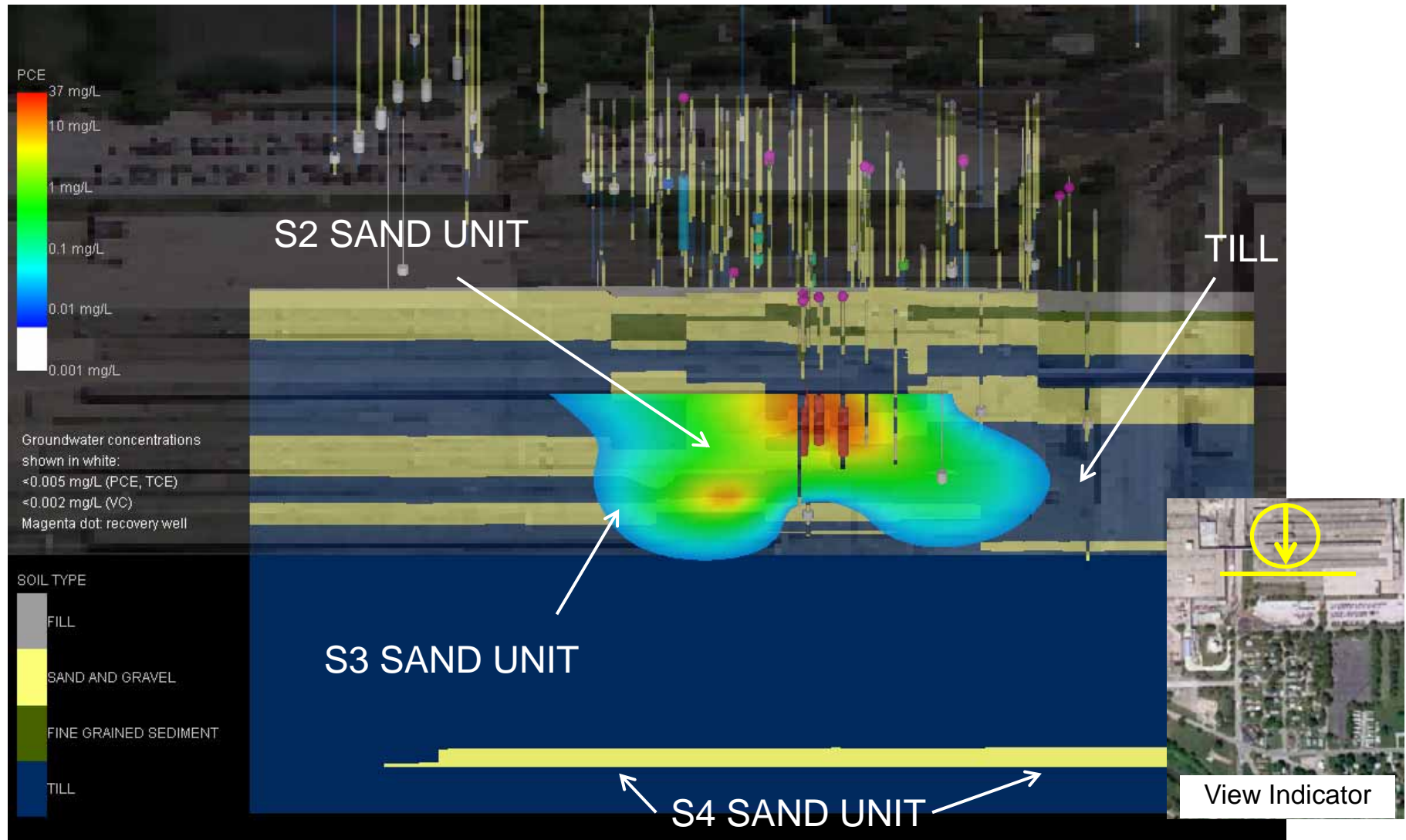
(West to East Slices, from the North)



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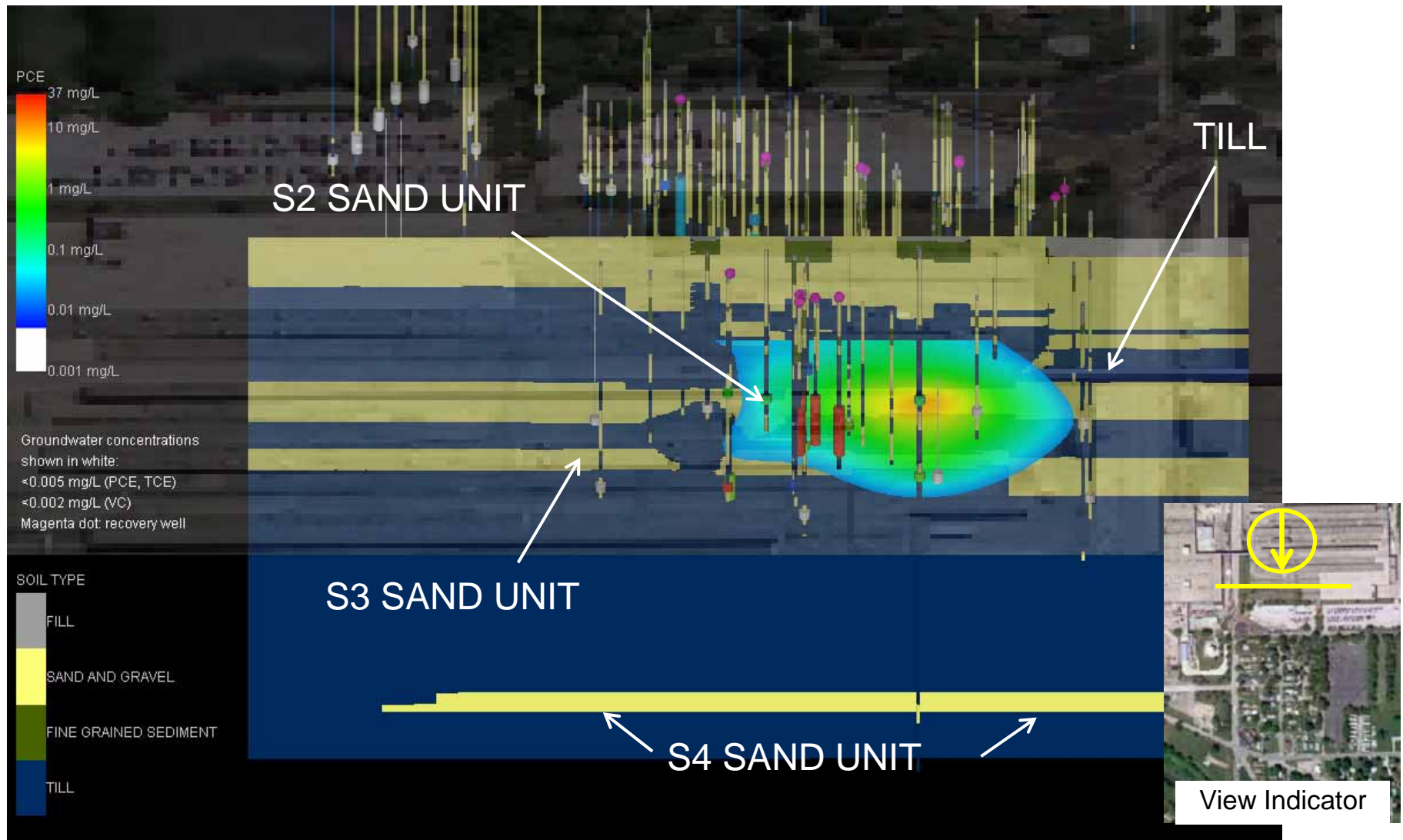
(West to East Slices, from the North)



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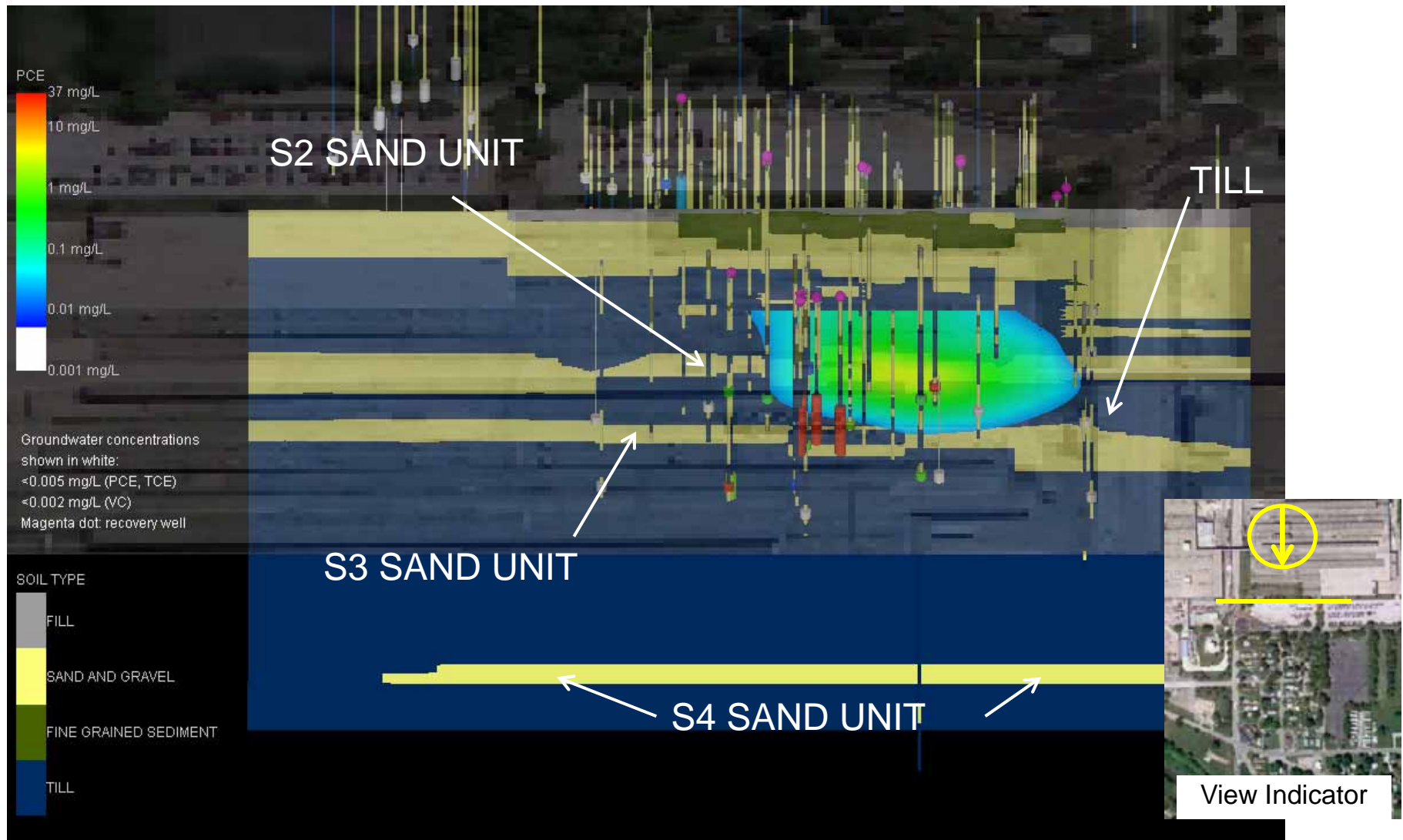
(West to East Slices, from the North)



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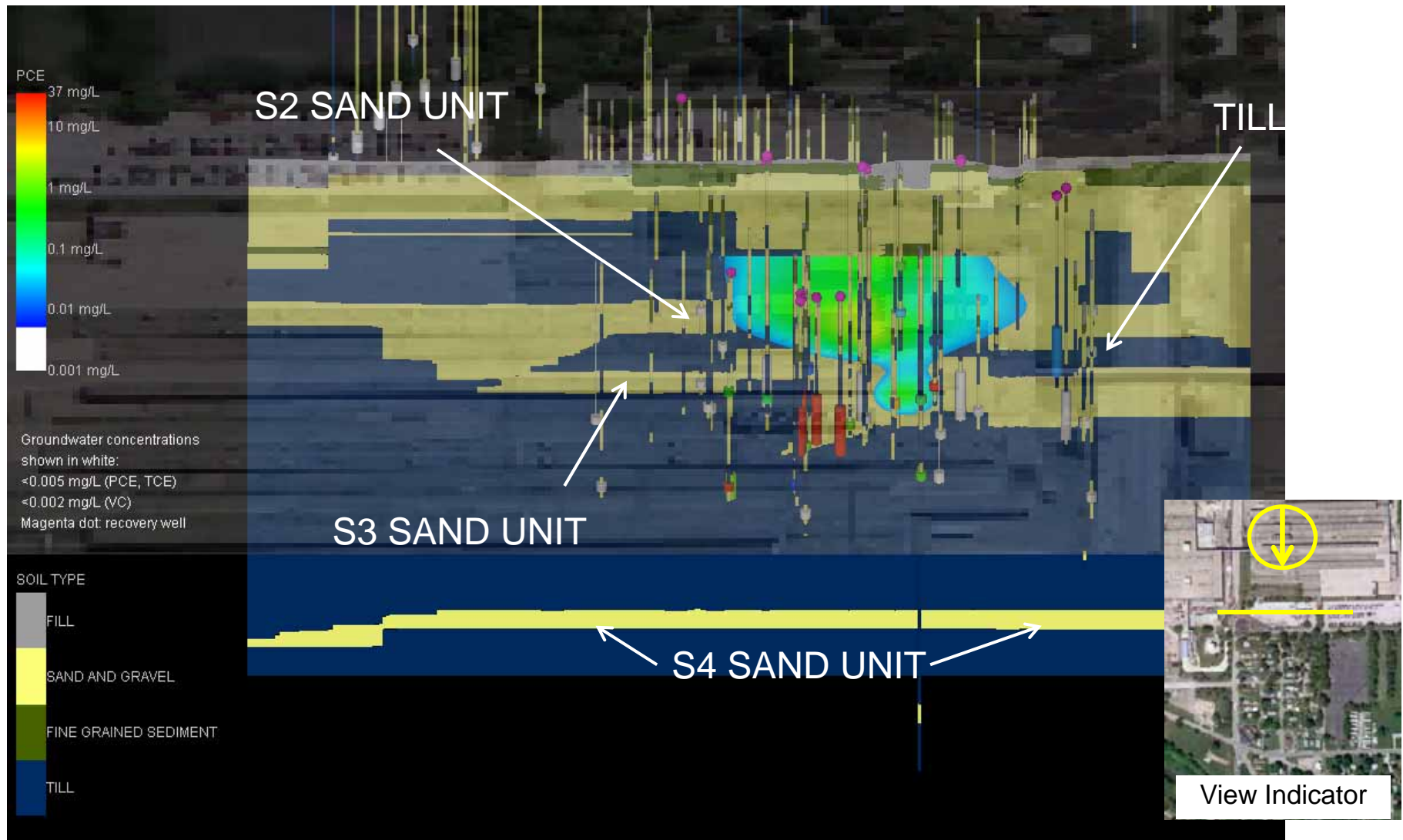
(West to East Slices, from the North)



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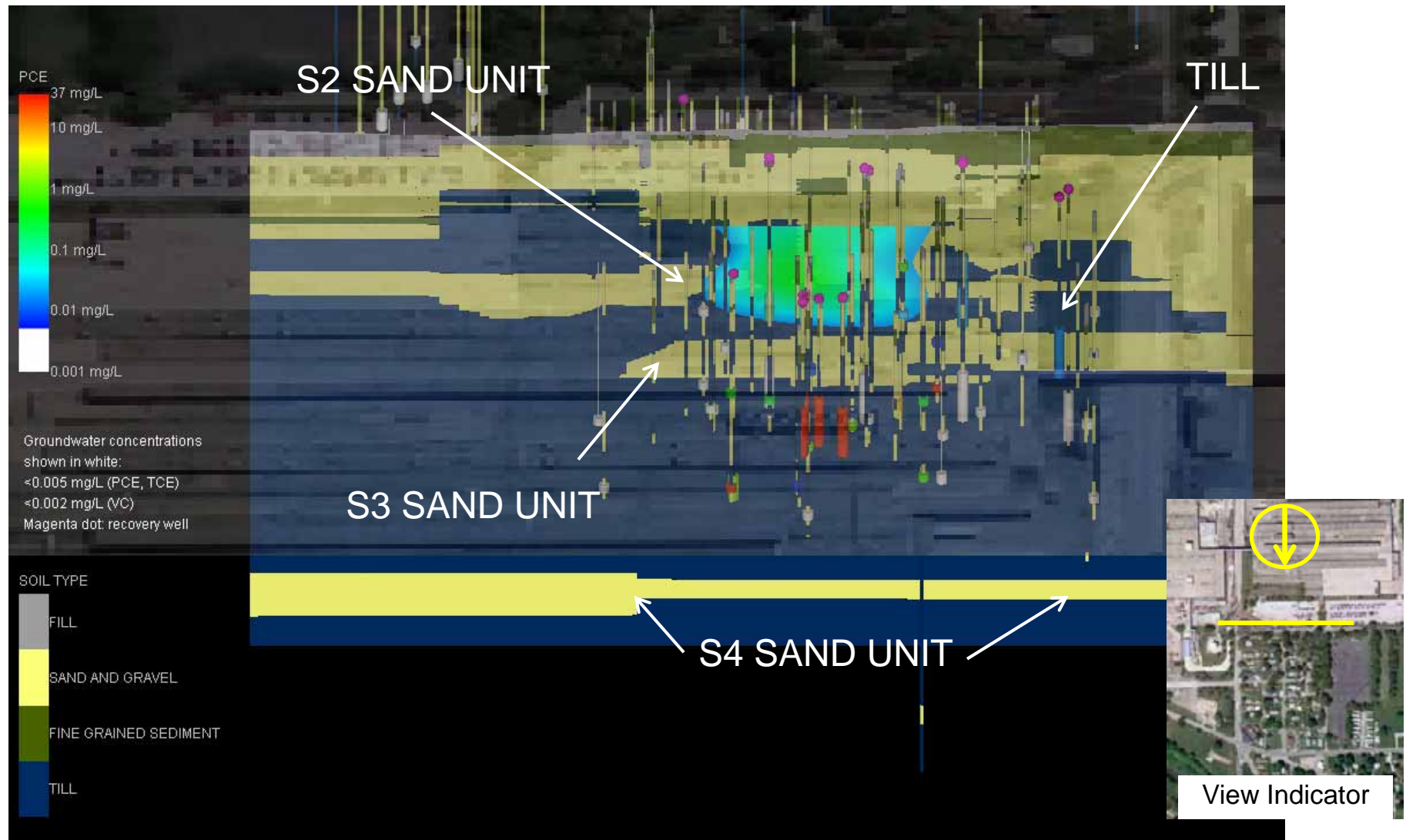
(West to East Slices, from the North)



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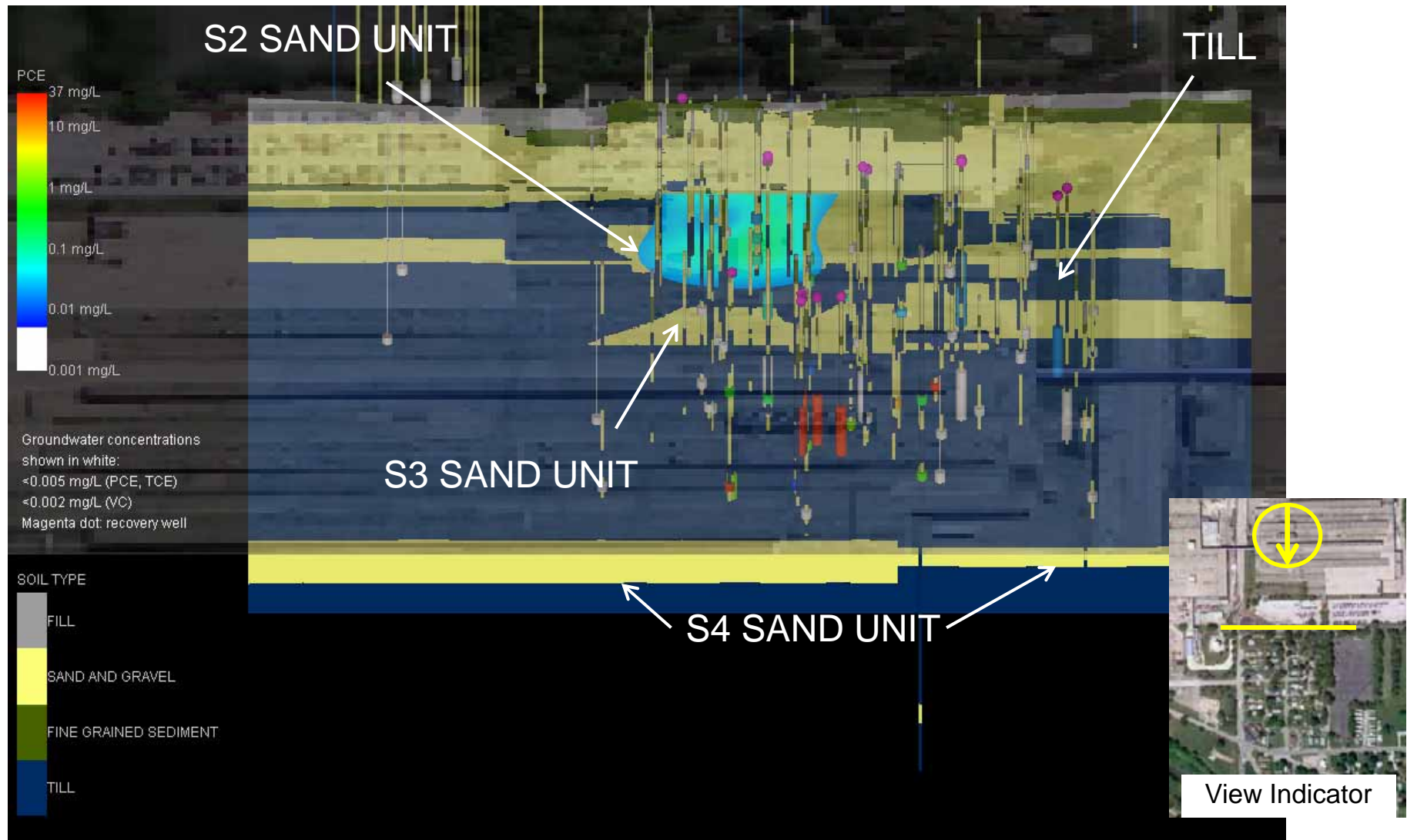
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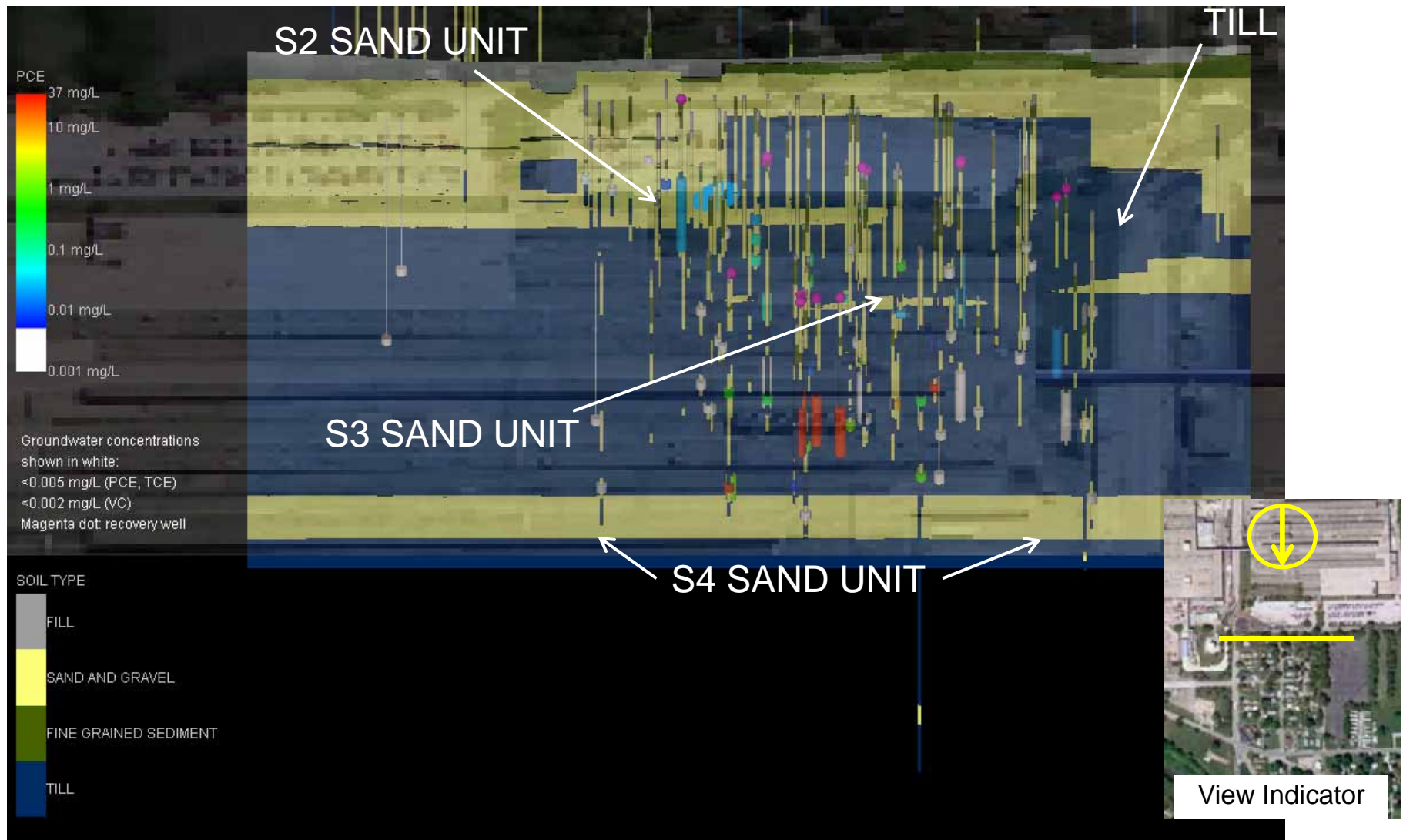
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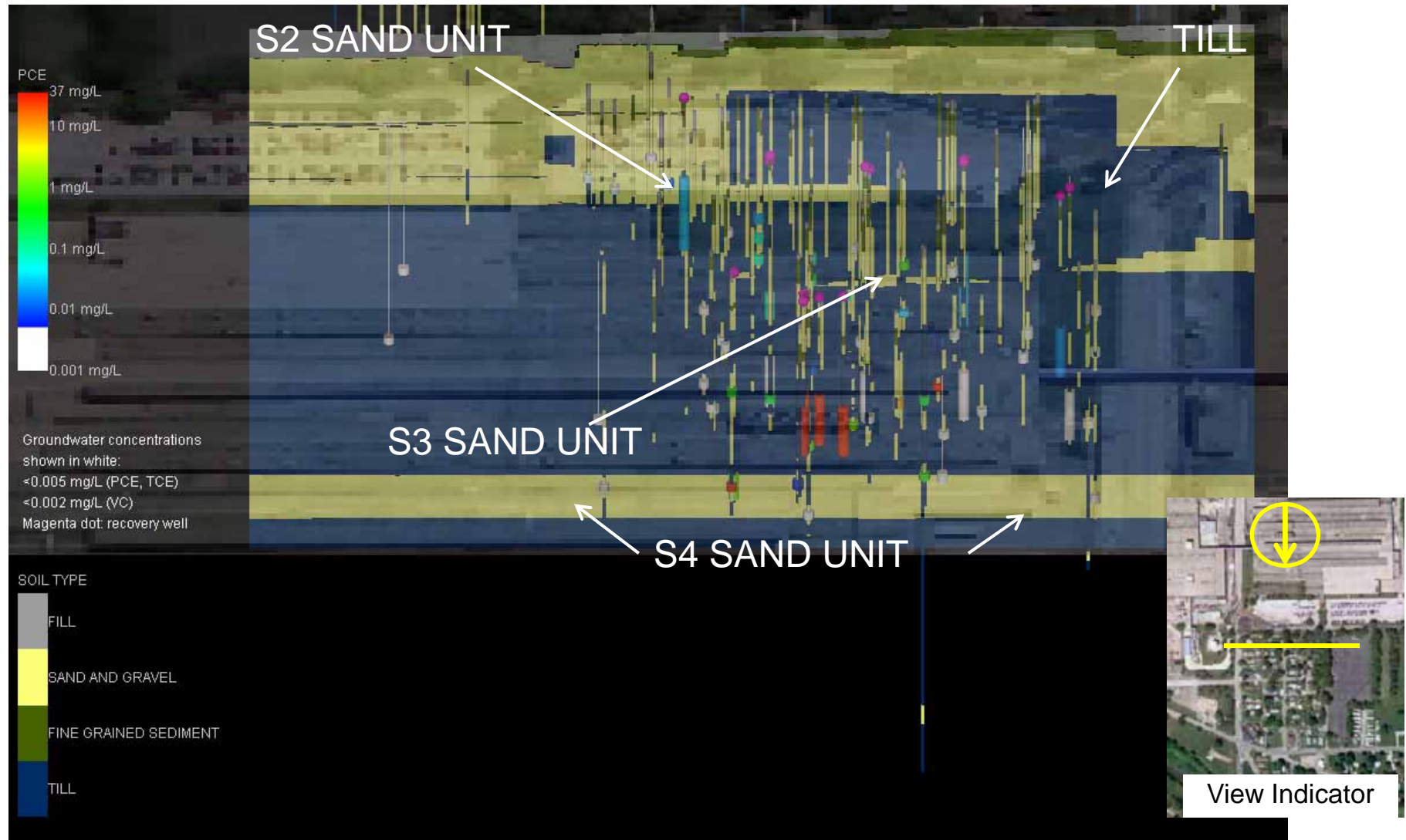
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